

GE Healthcare

Senographe DS Acquisition System

Operator Manual

CE 0459



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Revision 1

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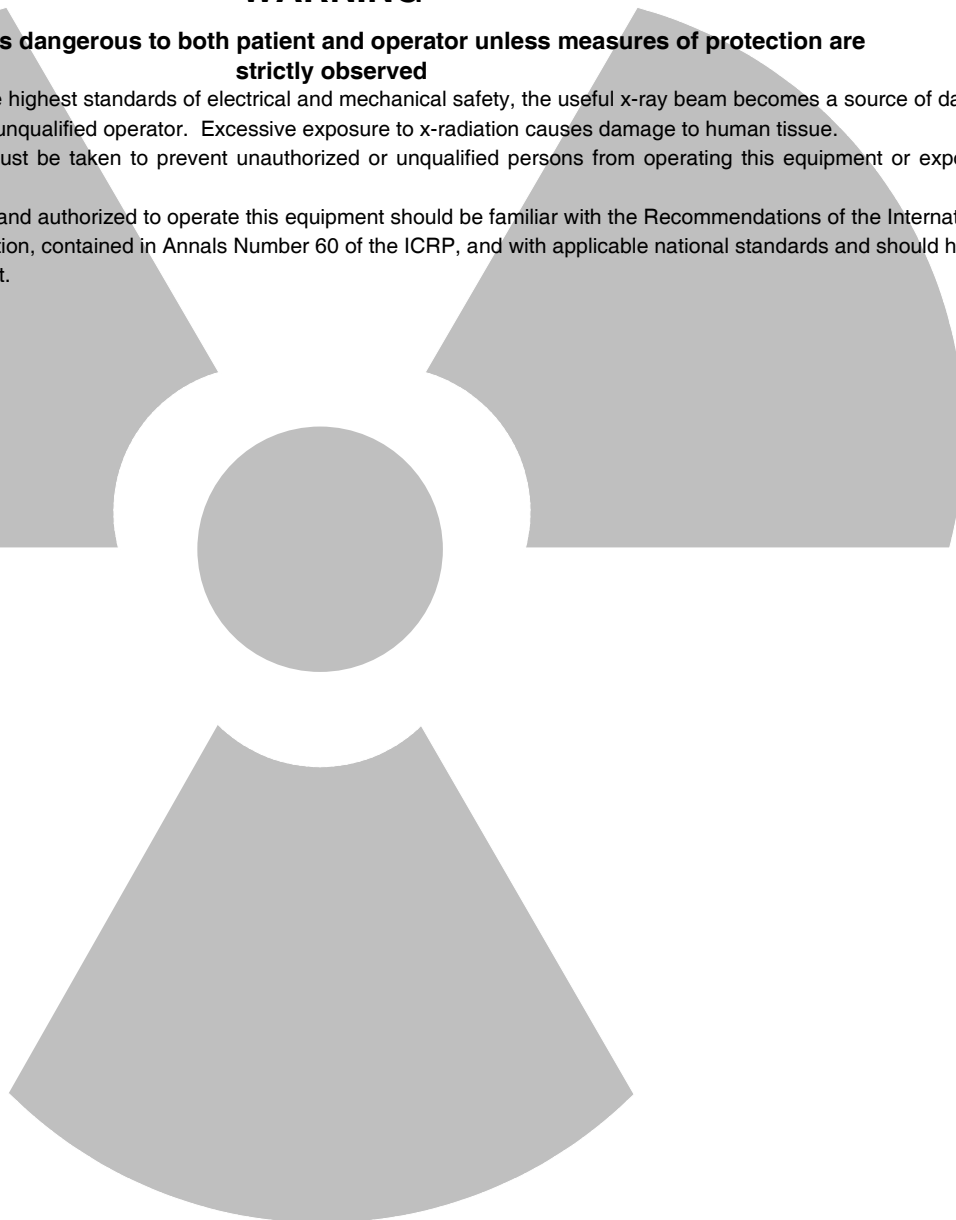
X-ray Warning**WARNING**

X-ray equipment is dangerous to both patient and operator unless measures of protection are strictly observed

Though this equipment is built to the highest standards of electrical and mechanical safety, the useful x-ray beam becomes a source of danger in the hands of the unauthorized or unqualified operator. Excessive exposure to x-radiation causes damage to human tissue.

Therefore, adequate precautions must be taken to prevent unauthorized or unqualified persons from operating this equipment or exposing themselves or others to its radiation.

Before operation, persons qualified and authorized to operate this equipment should be familiar with the Recommendations of the International Commission on Radiological Protection, contained in Annals Number 60 of the ICRP, and with applicable national standards and should have been trained in use of the equipment.



Regulatory Requirements

This product complies with the regulatory requirements of the following:

- Council Directive 93/42/EEC concerning medical devices: the  n45 label affixed to the product testifies compliance to the Directive.
European registered place of business:
GE Medical Systems Société en Commandite Simple
Quality Assurance Manager
BP 34
F 78533 BUC CEDEX France
Tel: +33 (0)1 30 70 40 40
- Code of Federal Regulations Title 21, Subchapter J - Radiological health.
- Underwriters' Laboratories, Inc. (UL), an independent testing laboratory.
- Canadian Standards Association (CSA).
- International Electrotechnical Commission (IEC), international standards organization, when applicable.

Compliance with these standards is evidenced by the presence of the appropriate labels on the exterior of the Generator cabinet.

- USA/HHS: United States Federal law restricts this device to use by or on the order of a physician.
- *General Electric Medical Systems* is ISO 9001 and ISO 13485 certified.
- The original document was written in English.

Use within the patient environment

All components of the Senographe DS system (Generator Cabinet, Gantry, Control Station) are designed to be suitable for use within the patient environment, and are compliant with the relevant standards (UL 60601-1, IEC 60601-1).

Use in the presence of flammable gases

The Senographe DS system must not be used in the presence of flammable gases

Image annotations

- The equipment includes a function IMAGE ANNOTATIONS, which allows the physician to store information on the patient.
- Note that the European Directive regarding "the protection of the people with regard of data management on their private life and to the free circulation of these data" requests the users of computerized files (radiologists, physicians) not to store data related to:
 - race,
 - philosophical opinions,
 - religious opinions,
 - political opinions,
 - etc.

Electromagnetic Compatibility (EMC)

This equipment complies with IEC60601-1-2 Edition 2 EMC standard for medical devices.

This equipment generates, uses, and can radiate radio frequency energy. The equipment may cause radio frequency interference to other medical and non-medical devices and radio communications. To provide reasonable protection against such interference, this product complies with radiated emissions as per CISPR11 Group 1 Class A standard limits.

Detailed requirements and recommendations about power supply distribution and installation are listed in the Pre-Installation section of the Service Documentation shipped with your system. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment is found to cause interference (which may be determined by turning the equipment on and off), the user (or qualified service personnel) should attempt to correct the problem by one or more of the following measure(s):

- reorient or relocate the affected device(s)
- increase the separation between the equipment and the affected device
- power the equipment from a source different from that of the affected device
- consult the point of purchase or service representative for further suggestions

The manufacturer is not responsible for any interference caused by using other than recommended interconnect cables or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the users' authority to operate the equipment.

All interconnect cables to peripheral devices must be shielded and properly grounded. Use of cables not properly shielded and grounded may result in the equipment causing radio frequency interference.

Do not use devices which intentionally transmit RF Signals (Cellular Phones, Transceivers, or Radio Controlled Products) in the vicinity of this equipment as it may cause performance outside the published specifications. Recommended separation distances are detailed in the Pre-Installation section of the Service Documentation shipped with your system. Keep the power to these types of devices turned off when near this equipment.

The medical staff in charge of this equipment is required to instruct technicians, patients, and other people who may be around this equipment to comply fully with the above requirement.

Further data and recommendations for meeting Electromagnetic Compatibility requirements for a typical installation are given in the Pre-Installation section of the Service Documentation shipped with your system. Note that the magnetic field of an MRI device located nearby may cause a risk of interference. Magnetic field amplitude limits are specified in the Pre-Installation section of the Service Documentation shipped with your system.

Recycling

- Machines or accessories at end-of-life:

The elimination of machines and accessories must be in accordance with national regulations for waste processing.

All materials and components that could pose a risk to the environment must be removed from the end-of-life machines and accessories (examples: dry and wet cell batteries, transformer oil, etc.).

Please consult your local General Electric Medical Systems representative before discarding these products.

- Packing materials:

The materials used to pack our equipment are recyclable. They must be collected and processed in accordance with the regulations in force for the country where the machines or accessories are unpacked.

Meaning of symbols



Protective ground (earth)



Ground (earth)



Dangerous voltage



Type B equipment



This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.



This symbol indicates that the product contains hazardous materials in excess of the limits established by the Chinese standard SJ/T11363-2006 (Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products).

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Foreword

This manual is provided for Senographe DS operators. It is designed to supply all the information required for the correct use of this equipment.

The manual has been written to describe the use of the Senographe DS in its most complete configuration. If any of the options described in this manual are not included in your system, skip the corresponding chapter or sections.

See your General Electric Medical Systems representative for the options available with the Senographe DS system.

Intellectual Property Rights

The Imaging Open Platform software used in the Senographe DS system is the property of the General Electric Company (U.S.A.). Copyright © 1993-2004 General Electric Company (U.S.A.).

Portions of this software are the property of and copyrighted by Sun Microsystems Inc., Informix Software Inc., OSF/Motif, J. Schilling, Free Software Foundation Inc., Merge Technologies Inc. and Cornell University.

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Chapter 1 Safety Recommendations

1 Introduction

Routine mammography provides the best method of early detection of breast cancer, and every effort should be made to encourage its acceptance by patients and all concerned organizations. Examinations performed regularly without problems are an essential part of this process. All aspects of mammographic exams, and especially safety, must be optimized to ensure effective diagnosis and allow the development of screening programs.

Safety precautions and recommendations for the avoidance of potential hazards, and against misuse, are given throughout this document. They must be made known to, and be practised by, all operators of the Senographe DS equipment.

This chapter is intended to bring attention to and emphasize some of the more important of these precautions and recommendations.

You are strongly recommended to keep this manual with the equipment at all times. Review it from time to time and be sure that you are familiar with all aspects of use of the equipment, and especially those affecting safety.

Stop all examinations and call your GEMS (General Electric Medical Systems) Service representative immediately if you believe that the equipment is not operating correctly.

2 Potential adverse effects

- The following is a list of potential adverse effects that apply to mammography and are also applicable to digital mammography using the Senographe DS system:
 - Excessive breast compression.
 - Excessive X-ray exposure.
 - Electric shock.
 - Infection.
 - Skin irritation, abrasions, or puncture wounds.

3 Emergency Stop Motion and Shutdown

- **Emergency stop motion switches** are provided on both sides of the Senographe DS Gantry examination column, easily accessible to the operator.

Push either of these switches to immediately stop all positioner movement. Any compression which may have been applied to the patient remains unchanged; the patient must be released by using the manual compression knobs.

After use of one of these switches, the operator must turn power off and on (from the X-ray Console) to restore normal use of the system.

- **If an emergency arises which requires complete removal of power from all parts of the system**, the mains isolator switch which supplies power to the system from the hospital supply must be switched off. Find out where this isolator is located and how to operate it.

Note that all image and patient information being processed at the time of cutting power will be lost, and that power for the environmental control of the Digital Detector will be cut (this may entail a delay before the system can be brought back into use).

4 Moveable components

The equipment includes a number of moveable components.

Users must be instructed to monitor all movements, and to take all due care and precautions when moving any part of the equipment in the vicinity of themselves or other persons.

To ensure safe operation at all times, the Senographe DS compression system is fitted with a magnetic braking mechanism, which prevents the compression paddle from falling in the event of power loss. If power loss does occur while a patient is under compression, the compression force remains unchanged. Disengage the patient by raising the paddle gently, using the manual compression knobs.

To minimize potential injury to the patient in decompression mode, the upward movement of the compression paddle is stopped if a downward force greater than 3 daN is applied.

5 Operator protection against radiation

To avoid excessive exposure to radiation, operators must remain behind suitable radiation shields whenever X-ray exposures are made.

It is essential that the X-ray Console used to control X-ray exposures be permanently mounted behind a radiation shield, in such a way that it can only be used by an operator in the protected area. If other controls, such as the AWS controls in the Senographe DS Control Station, are to be used during exposures, then they also must be installed in the protected area.

These requirements are met by the Senographe DS Control Station, which includes a radiation shield (700 mm/25 inches wide; 0.3 mm lead equivalence shielding) and provides a suitable mounting position for the X-ray Console in the protected area. Other radiation shields are available if required to meet the requirements of local regulations or hospital working practices.

6 Before starting an exam

Check the system:

- Check that the compression paddle and the Bucky (grid) or magnification stand, are all well inserted in their supports, and are being used as recommended. Be sure that the breast support is locked (not only inserted).
- No modifications to system hardware or software may be made without prior approval from GEMS. GEMS cannot guarantee the integrity of the system if this recommendation is not followed.
- No application programs of any sort may be loaded onto the system computer without prior approval from GEMS. GEMS cannot guarantee the integrity of the system if this recommendation is not followed.
- Only accessories and components supplied by or specifically recommended by GEMS may be used with the system. GEMS cannot guarantee the integrity of the system if this recommendation is not followed.
- Only Senographe DS compression paddles may be used with the system. Use of other paddles may adversely affect image quality by causing inaccurate measurements of breast thickness.
- All accessories should be checked regularly to ensure that they have no sharp edges or corners which might cut, pinch, or otherwise hurt a patient.
- Check the integrity of the covers on the Compression Arm, Column and Control Station. If any of these covers is damaged or detached, contact your GEMS Service representative to have it replaced.

Check the patient:

Before beginning the mammogram, observe the following points:

- Before positioning the patient, make a visual assessment of the breast area, and note anything which may affect or be adversely affected by the correct positioning of the breast for the mammogram, for example, warts, scarring, or skin which is not intact. In patients with large breasts, perspiration under the breast can cause the skin to soften, and become paper-thin.
To position the breast properly for a mammogram in the CC position, it is essential that the breast is lifted away from the chest wall and gently pulled forward, in order to visualize the maximum amount of breast tissue. Such pulling and lifting is necessary for correct positioning, but can cause damaged skin to tear slightly, and may cause bleeding.
If any condition exists which may cause unusual discomfort or tearing of the skin, the patient should be told of the importance of correct positioning, and should be warned in advance of the possibility that minor tearing and /or slight bleeding might occur.
- Use suitable techniques for the positioning of patients with breast implants.
- It is normal that the front part of the breast support is warm to the touch, as it contains electronic components which generate heat. However, the temperature is never high enough to be harmful.
To ensure that examinations are carried out under optimum conditions, any unusual rise in temperature causes a warning message to be displayed on the monitor screen, forbidding examinations. Any further rise causes the detector system to be automatically shut down.
- GEMS can take no responsibility for injury to the patient caused by the use of heating or warming devices external to the system.

7 Acquisition and storage of Images

Images acquired during examinations are stored on an internal disk system for preliminary assessment, before permanent archiving or printing to film. The system is designed to avoid all foreseeable problems during the acquisition and storage operations. Precautions include continuous checks on all components and the provision of a battery-backed UPS (Uninterruptable Power Supply), to allow correct processing of images to be completed before shutdown in the event of a power failure.

Certain conditions may cause a loss in the ability of the system to acquire high quality images or a risk that images might not be correctly saved (for example, if the UPS batteries are not sufficiently charged to ensure correct shutdown). For these conditions a warning message is displayed on the Liquid Crystal Display (LCD) monitor and/or the Gantry X-ray Console. A list of possible error messages, with explanations and suggested actions, is given in Chapter [16 Error messages](#).

You should note the following recommendations:

- Always follow the correct system shutdown procedure as described in Chapter [6 Startup and Shutdown](#).
- In spite of the presence of the UPS, it is not advisable to switch off power while an image is being processed and stored.
- If defects or failures on the disk system are observed, *call your GEMS Service representative*. It may be possible to recover information on the disk if the damage is not too severe.

8 Archiving



The digital technology used by the Senographe DS Control Station provides the ability to transfer acquired images between workstations, and to store them on hard disk. However, it is not intended or approved for use as an Archiving device.

9 AOP Mode

The Senographe DS provides an AOP (Automatic Optimization of Parameters) operating mode. This mode is designed to optimize image quality for the examination of breasts with a compressed thickness between 10 mm (0.4 inch) and 80 mm (3.15 inches).

However, there are some types of examination for which manual selection of parameters may be more suitable. These are discussed in Chapter [12 Image Acquisition Procedure](#).

Note:

GE recommends that Standard (STD) and Dose (DOSE) mode be used for routine mammography. The Senographe DS Contrast (CNT) mode delivers more dose than Standard and Dose modes. GE recommends that Contrast mode be used only after consultation with an interpreting physician or radiologist.

Note:

To fulfill the requirements of certain countries, if desired, access to Contrast Mode can be restricted as described in the Service Documentation.

10 Residual images

Repeated exposures made with a high contrast object in the digital detector area may lead to the creation of a ghost image, caused by an excessive difference of residual charges between cells of the detector. The time taken for this ghost image to disappear depends upon the magnitude of the residual charges.

This effect can occur during checks to measure the X-ray field which use a dosimeter ionization chamber in the beam. To avoid it, use one of the following solutions:

- Reduce the contrast of the object by including it in a field protected by an X-ray attenuator of adequate thickness.
- Use the internal dose measurement facility.
- Protect the digital detector by means of a 3 mm steel plate for the duration of the measurements.

11 Damaged Equipment

CAUTION

If equipment is damaged or fails, have it repaired immediately by authorized GE Service personnel, even if the damage or failure does not affect the functions you normally use. The damage or failure can result in a potentially serious patient safety hazard under other circumstances.

12 Damage to the Digital Detector

CAUTION

The digital detector contains thallium doped cesium iodide, a substance which requires special precautions for handling and recycling. If the protective casing of the digital detector sustains damage, please consult your local GEMS representative.

CAUTION

If the digital detector casing is punctured, the detector must be removed by authorized GE Service personnel wearing protective gloves and dust masks.

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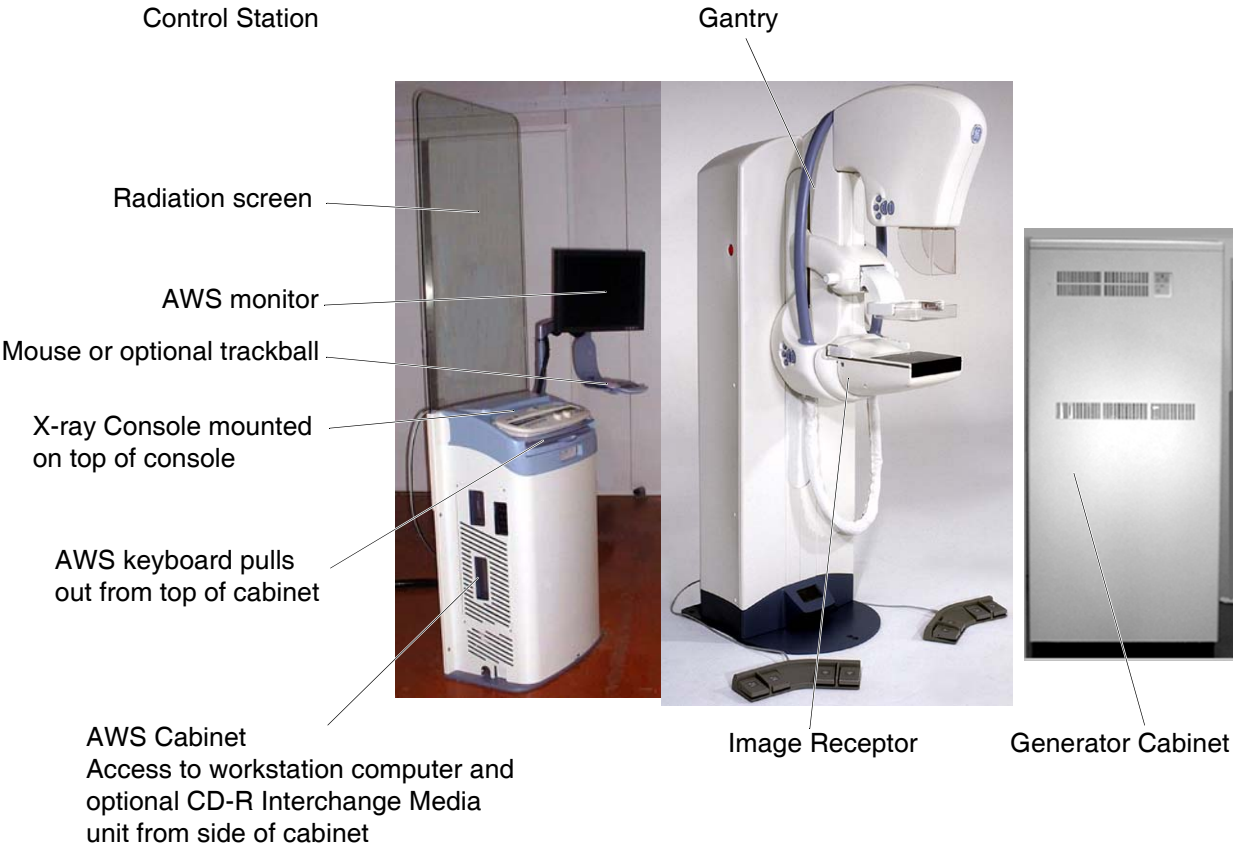
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Chapter 2 Introduction

1 Overview

Senographe DS is a Digital Mammography System from GE Medical Systems. It has been designed to perform Screening examinations as well as Diagnostic Views (including Spot compression, Magnified and/or Coned views). It is a *modular* system that eliminates the need for film cassettes, and takes advantage of digital technology, including on-screen image display, Networking, Filming, and Archiving.

2 System components



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3 Accessories and options

3-1 Senographe DS accessories

Accessories delivered with the Senographe DS or available as options are listed in Chapter 3 [Senographe DS Gantry and Generator](#).

3-2 System options

System options available include:

- Review workstation
- Mass archiving system

When this option is installed and connected to the Senographe DS, acquired images can be sent to the mass archiving device for permanent storage, either automatically or on request. A list of all patients ever imaged on the Senographe DS system can be kept on the mass archiving device, making future retrievals fast and easy.

- Laser Camera

To provide "hard copies" of images, the Senographe DS system can be connected to a high resolution DICOM MG compatible laser camera for film printing.

WARNING

Only images produced by ge-recommended laser cameras can be used for final interpretation of examinations. for compatible printers see the latest product data sheet for this system, which may be obtained from your local ge sales representative.

- Networking

The Senographe DS is DICOM compliant, allowing it to be connected in a network with other compliant devices for the exchange of images. Networking allows transmission of images acquired with the Senographe DS system to other DICOM-compatible review stations, using the "Network Push" function of the Browser. In some cases, detailed evaluations will be needed for the implementation of customized connections.

See your General Electric Medical Systems Representative for more information on accessories and options.

4 Indications for use

The Senographe DS system generates digital mammographic images which can be used for screening and diagnosis of breast cancer.

The Senographe DS system is intended to be used in the same clinical applications as traditional mammographic film/screen systems.

5 Contraindications

There are no known contraindications.

6 Training program

Users must ensure that they receive training on the Senographe DS with GE Medical Systems training programs prior to use on patients. For systems subject to Mammography Quality Standards Act (MQSA) rules, the Radiologic Technician, Interpreting Physician, and the Medical Physicist are each required to obtain eight hours of new-modality training for full-field digital mammography. Additional information can be found on the FDA's mammography website: <http://www.fda.gov/cdrh/mammography/index.html>.

7 How to use the manual

Because of the ergonomic graphical interface, you will find the Senographe DS easy to use.

You should take time to study the manual to become fully familiar with all features, and to learn how to use the more complex functions to their full extent.

- **For important safety and regulatory information**, study the [Regulatory Requirements on page 3](#) of this manual and the chapter on Safety Recommendations (Chapter 1 [Safety Recommendations](#)). These sections are extremely important, describing safety and regulatory issues that you *must* thoroughly understand *before* attempting to use the Senographe DS system.
- *To learn about system components and features*, refer to the general description of system features in section [2 System components on page 19](#) of this chapter, and to Chapter [3 Senographe DS Gantry and Generator](#), [4 X-ray Console on page 31](#), and [5 Control Station on page 43](#).
- *To become familiar with the use of windows, menus, and controls* on the Senographe DS workstation, refer to Chapter [5 Control Station](#).
- *For information on system startup and shutdown and user account management*, refer to Chapter [6 Startup and Shutdown](#) and Chapter [7 User Session and Account Management](#).
- *To learn about the features of the Browser window*, which is the main window used to select images for review, for transfer to other workstations or to a mass archiver, and to start Senographe DS applications, refer to Chapter [8 Browser](#).
- *For information on the powerful task management and image review functions*, refer to Chapter [9 Worklist](#) and Chapter [11 Viewer](#).
- *For a guide to standard procedures when performing an image acquisition*, refer to Chapter [12 Image Acquisition Procedure](#).
- *To print images and to save images on recordable CD*, refer to Chapter [13 Printing](#) and Chapter [14 Interchange Media](#).
- *To assure continued high level operation of the Senographe DS*, follow the quality control procedures specified in Chapter [15 Maintenance](#).

8 Conventions for this manual

8-1 Typographical

- In text describing the user interface, *italic* and **bold** characters are used to differentiate between body text and on-screen or hardware captions and labels, entered text, etc.:
 - Italics are used for references to hardware items and text which appears on-screen (e.g., menu titles, button labels, on-screen messages, etc.).
 - Bold face is used when specific instructions are given for the entry of text or selection of a menu option, etc. If the operation or text entry includes the use of a keyboard or mouse button, its name is shown between angle brackets, to distinguish it from entered text, e.g., **123<Enter>** would be written for an instruction to type 123 followed by the *Enter* or *Return* key.
- In other text:
 - Italics are used when a specific concept is introduced.
 - Italic and bold characters may also be used for local emphasis.
 - Blue italics are used for cross references.

8-2 Definitions

The various safety and cautionary notes throughout this manual are defined as follows:



Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.



Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury.



Notice:

Used for instructions to the user to prevent damage to property.

Note:

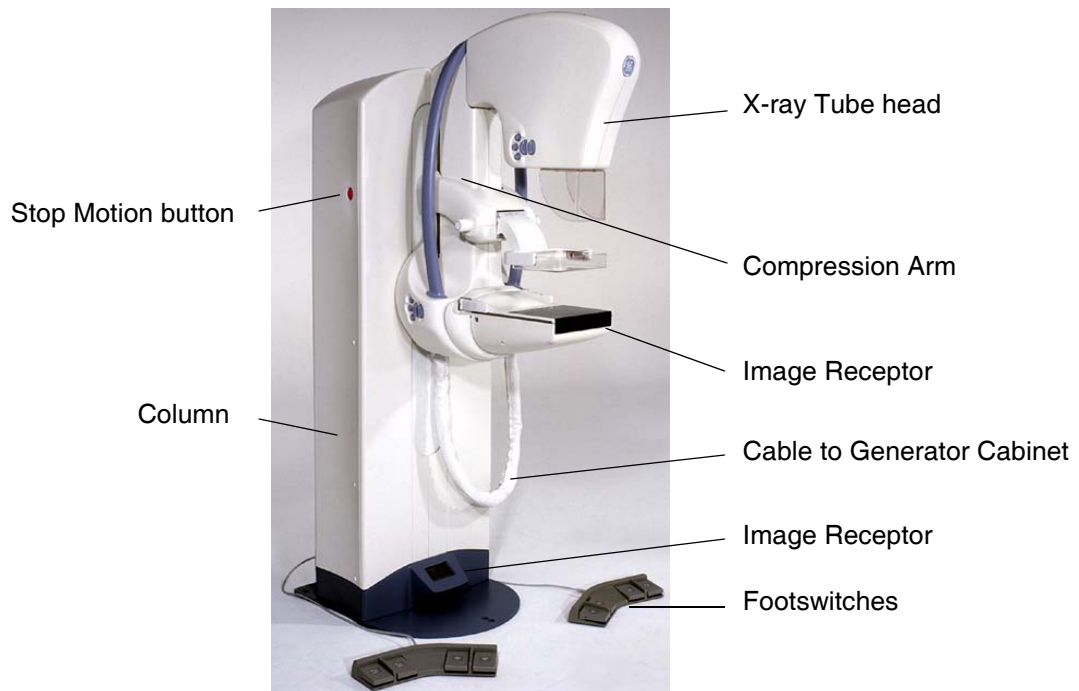
Used to draw attention to information that is important for the user to know.

Chapter 3 Senographe DS Gantry and Generator

1 Gantry Overview

The main components of the Senographe DS Gantry are shown below:

The Gantry Column must be securely fixed to the floor, using the provided base plate.



- **Column:** This supports the Compression Arm and allows it be moved vertically, it includes two cylinders: a fixed cylinder and a telescoping cylinder which elevates the Arm.
- **Compression Arm:** The Compression Arm is connected to the Column by a rotating shaft; it can be rotated through the range of +185 degrees to -165 degrees.
- **Gantry Readout:** The Gantry Readout display normally shows the following information (left to right):

Compressed breast thickness in mm.

Angle of rotation.

Compression force in daN.

It may also be used for warning messages and (for Stereotaxy applications) angulation information.

- **Stop Motion buttons:** There are two Stop Motion push-buttons, one on each side of the Column. Press one of these buttons to immediately stop all Gantry movement. X-ray acquisition remains possible.



Note:

If the Arm touches an obstacle during downward movement, the movement is stopped.

- **Stop pre-set automatic rotation of the arm:** An automatic rotation movement started by pressing one of the preset view selection buttons can be stopped at any time, by pressing any of the buttons located on the arm or one of the footswitches on the floor, or by touching the compression paddle.

1-1 X-ray Tube Head

View behind tube head

Collimator light and
FOV buttonArm Movement
Control buttons

Tube Head

Face Shield

- **X-ray Tube Head:** Contains the X-ray Tube, the Collimator diaphragm, and the centering light.
- **Face shield:** This is mounted on the front of the X-ray Tube and Tube Housing Assembly by sliding it into its mounting holes. It can be easily fitted and removed as required.

CAUTION

The face shield must be removed when using a Mag Stand.

When mounting the face shield, it must be pressed firmly into place to ensure correct alignment. Make sure, by looking underneath the tube head, that the face shield is pushed all the way forward, so as not to miss any chest wall tissue.

1-2 Arm movement control buttons

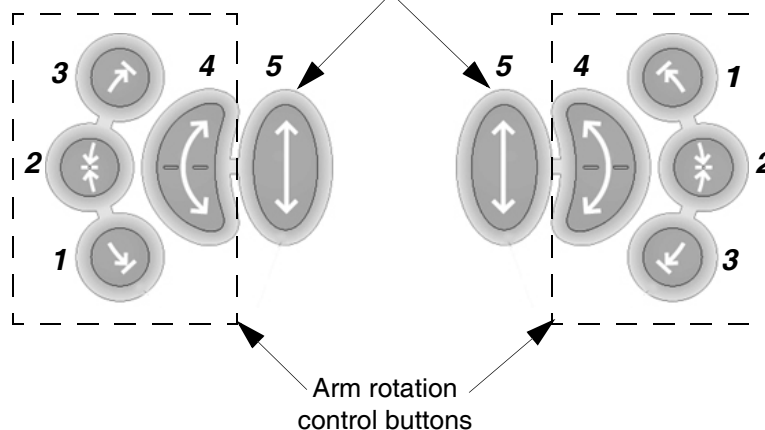
- Arm movement control buttons

Four sets of five buttons are provided, one on each side of the X-ray tube head and one on each side at the base of the handle. They are all used in exactly the same way.

Left of Arm

Arm elevation
control buttons

Right of Arm

Arm rotation
control buttons

1-2-1 Arm rotation control buttons (references 1, 2, 3 and 4 in the illustration)**1-2-1-1 Movement to any required position**

- **Rotation control buttons;** reference 4. Use either right or left button 4 to rotate the Arm in the direction of the arrow.
Press the top or bottom of the button gently to rotate the Arm in the direction indicated by the arrow at low speed.
Press harder to increase the speed of movement to the chosen preset value of 20 or 40 degree/second. Release the button to stop the movement.

1-2-1-2 Movement to memorized positions**Memorized positions**

Automatic rotation can be used for movement to one of three memorized positions as shown in the table below.

For automatic rotation to a memorized position ("last-used" or default)			
Memorized position name	Use button reference	Last-used position (overrides Default position)	Default position (applied at each power-up)
CC	2	N/A	0°
+Oblique	1	Set when an exposure is made at an angle between +5° and +80°.	Operator choice, between +30° and +80°
-Oblique	3	Set when an exposure is made at an angle between -5° and -80°.	Operator choice, between -30° and -80°

When a new position is memorized, the same numeric value is set for positive and negative movement. For example, if an exposure is made which sets the last-used +Oblique angle to +50°, the last-used -Oblique angle is set to -50°.

How to reach a memorized position

- To rotate the Arm to one of these positions, press the button shown for more than one second and then release it.
- An automatic rotation movement started by pressing one of these buttons can be stopped at any time by pressing any of the buttons located on the Arm or one of the footswitches on the floor, or by touching the compression paddle.

1-2-2 How to choose a Default position value

- The two factory settings for the Default values are $\pm 45^\circ$.
- To change these values, use the X-ray Console set-up menus; see section [3 X-ray Console setup menus on page 37](#).

1-2-3 Arm elevation control buttons (reference 5 in the illustration)

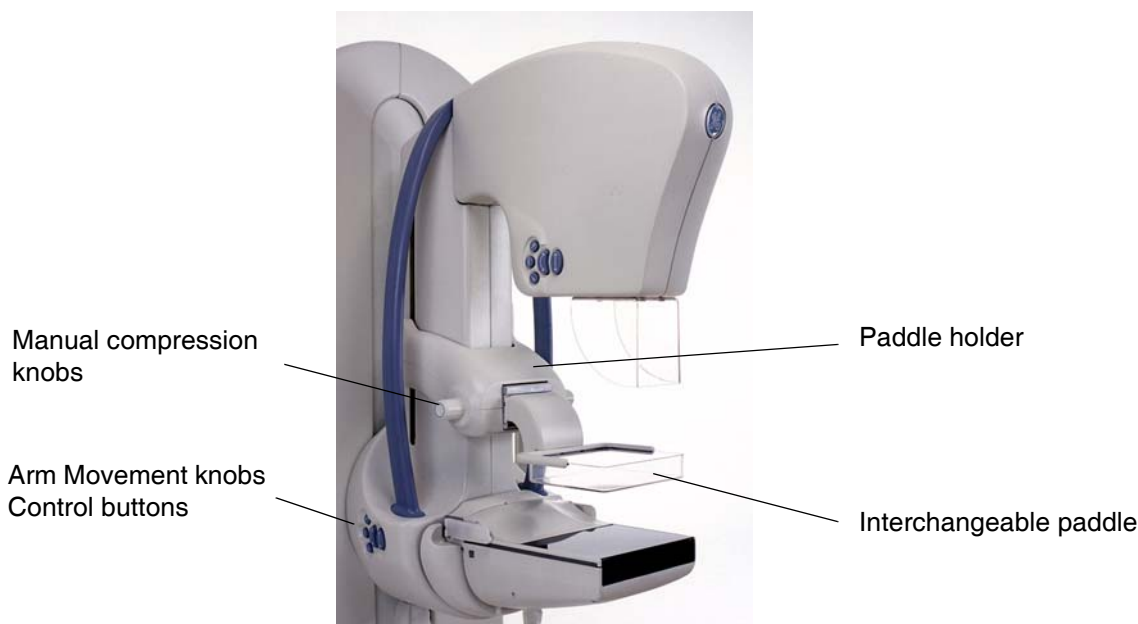
- Use one of these buttons to move the Arm up or down. Press the top or bottom of the button lightly to move the Arm up or down at low speed. Press harder to increase the speed of movement. Release the button to stop the movement.

Note:

If the Arm touches an obstacle during downward movement, the movement is stopped.

- Collimator light and FOV button** (behind the tube head):
When the collimator light is off, press this button to switch the light on for approximately 45 seconds. When the light is on, press the button to change the field of view to the next available size. With the Bucky mounted, the sequence is 19 x 23, 13 x 18, 9 x 9 (and then back to 19 x 23). With a mag stand mounted, the sequence is 13 x 23, 13 x 18, 9 x 9 (and then back to 13 x 23).

1-3 Compression Arm



The **compression system** includes the paddle holder, the manual compression adjustment knobs, and the interchangeable compression paddle.

Compression and decompression are controlled by the manual compression knobs or by foot pedals placed on the floor. Pre-programmed decompression may be activated automatically at the end of an exposure, or by use of the compression release button on the X-ray Console.

Maximum compression force, speed of compression and decompression height are programmed from the *medical set up* menu.

- Automatic compression speeds**
The speeds of movement when using automatic compression are normally set to:
Up: 9 cm/sec (3.54 inch/sec).
Down: 7 cm/sec (2.76 inch/sec), falling to 5 mm/sec (0.2 inch/sec) on breast contact.
- Manual compression knobs**
Located on each side of the compression paddle arm, they allow manual adjustment of the compression. Turn the top of the knob towards the patient to increase compression, away from the patient to decrease compression.

- **Maximum compression force**
The maximum compression force is 20 daN for motorized compression or 30 daN for manual compression.
- **Arm movement control buttons**
Two sets of five buttons are provided, one on each side of the Arm.
They are used in exactly the same way as the corresponding buttons on the sides of the tube head, described in section [1-1 X-ray Tube Head on page 24](#).
- **Arm rotation**
The Arm can be rotated between +185° and -165°.
- **Interchangeable paddle**
The type of paddle inserted in the paddle holder is recognized by the system and displayed on the Gantry readout. Only paddles designed and validated for use with the Senographe DS system should be used; the characteristics of these paddles are known by the system and are taken into account, together with the known characteristics of breast tissue, when calculating parameters such as compression force and breast thickness.

**Notice:**

When a paddle is used to apply compression to a rigid phantom (e.g., plexiglass), the thickness indicated on the Gantry readout is not correct, because of the different characteristics of the material as compared to breast tissue.

1-4 Image Receptor

The Image Receptor contains the Digital Detector and associated components for image acquisition. It is used with a Bucky, which can be replaced by a Mag Stand for magnification views.

- The **Bucky** slides into the top of the Image Receptor and supports the breast during examinations.

Removal: Open the latches on both sides to release the Bucky, then slide it out.

Insertion: Slide the Bucky into its rails, then close the latches firmly on both sides.

- For magnification views, remove the Bucky and slide the Mag stand into the Bucky rails. Close both latches firmly.

Magnification factors are defined in the middle of a 4 cm thick breast, i.e., 2 cm above the Mag stand. Two Mag stands are available: one for a magnification factor of 1.5 and one for 1.8.

- The Image Receptor is placed as required for correct patient positioning by moving the Arm. The height of the Bucky breast support surface from the floor is adjustable between about 650 mm (26 inches) and 1500 mm (59.1 inches) with the Arm in the 0° position.

Note:

Surfaces which contact the breast (e.g., the Bucky, the mag stand, and compression paddles) must always be kept clean; see Chapter [15 Maintenance](#).

1-5 Accessories

Accessories delivered with the basic configuration of the Senographe DS Gantry include:

- 19x23 compression paddle (for use with Bucky only).
- Square spot compression paddle (for use with Bucky only).
- Round spot compression paddle (for use with Bucky only).
- Axillary compression paddle.
- Radiation screen.
- 1.5 magnification stand
- 1.8 magnification stand
- 19x23 magnification paddle (for use with magnification stand only).
- Round spot magnification paddle (for use with magnification stand only).
- 7x7 square magnification paddle (for use with magnification stand only).



1-6 Optional Accessories

Optional accessories available for the Senographe DS Gantry include:

- Optical localizer (consisting of 2D cross-hair localizer and 2D large localization paddle) for two dimensional biopsy.
- Examination chair.
- Accessories storage unit.
- Remote handswitch.
- Bar code scanner.
- 2D large localization paddle.
- 2D spot localization paddle.
- Flexible 19x23 paddle.

The flexible paddle is designed to provide uniform compression from chest wall to nipple, by tilting with respect to the Bucky as compression is applied. It is self-adjusting, and can be used in place of the parallel paddle. The flexible paddle is not intended to remain flat and parallel to the breast support surface when compression is applied. It does, however, comply with MQSA Quality Mammography Standard 21 CFR 900.12(b)(8)(ii)(C) regarding equipment intended by the manufacturer's design to not be flat and parallel to the breast support surface.

To ensure continued performance of this compression paddle according to its specifications, the tests described in Chapter [15 Maintenance](#), section [3 Test for flexible paddle deflection in compression on page 161](#) should be performed at least once every year or when a loss in performance is suspected. The test results must meet the following action limits:

- Minimum deflection 12 mm;
- Maximum deflection 14 mm.

Notice:

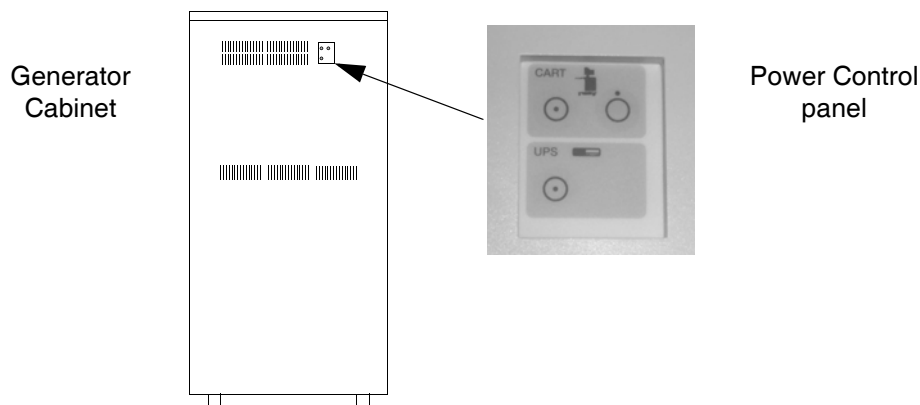
To avoid any risk of premature failure, it is recommended that the 2D large localization paddle and all spot paddles (7x7 square magnification, round spot magnification, and 2D spot localization) should be used with a maximum compression force of 20 daN.

CAUTION

Only Senographe DS recommended paddles and accessories should be used with this equipment. Failure to heed this warning may cause unexpected results and possible data loss.

2 Generator Cabinet Overview

The Generator Cabinet contains power switching equipment, the generator and system management electronics, and a chiller/dryer (connected to the Digital Detector for control of the detector environment).



- The cabinet is mounted on wheels for ease of installation; it is not recommended that it be moved in normal operation.
- Do not obstruct the ventilation slots.
- The power control panel visible on the cabinet controls power to the Control Station and to the UPS. It is normally used only for Service operations.

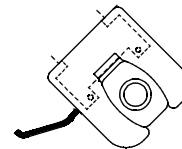
Chapter 4 X-ray Console

1 Console overview

- The X-ray Console, illustrated below, provides control buttons and status indicators which enable the Operator to prepare, execute, and monitor X-ray exposures.
- LCD panels display machine replies and messages.
- The console controls power On/Off facilities. It is used to power up the complete system, and to power down the Gantry and Generator.
- The console is normally mounted on the AWS Cabinet, behind the radiation screen.



Plugs for connection of remote handswitch and cable to generator



Optional remote handswitch (usually mounted on the side of the AWS cabinet)

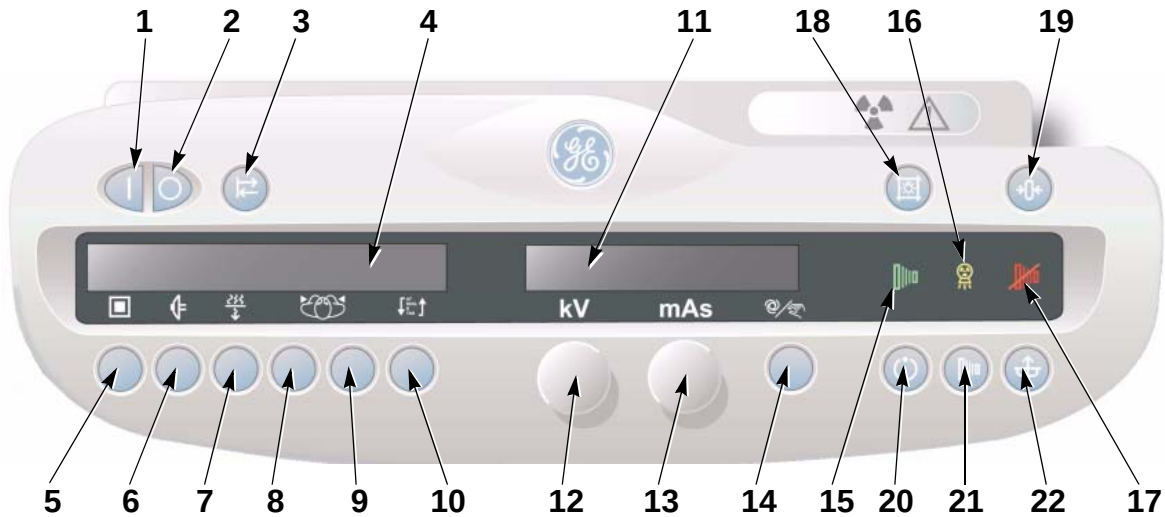
Note:

The symbol  on the console indicates that you must have read and understood the operator manual before taking any action.

Refer to the following pages for information on each of the console control buttons, switches, and displays.

2 Console functions

The illustration and table below identify the various console buttons, switches and displays. Information on each numbered item is given in the following pages.



1	System power on switch I	12	kV selection
2	Gantry/Gene. power off switch STOP or 	13	mAs selection
3	Setup button	14	AOP, Manual Mode selection
4	Readout display	15	Exposure Enable indicator lamp
5	Focal Spot selection	16	Exposure indicator lamp
6	Focal Track selection	17	Exposure Disable indicator lamp
7	Filter selection	18	Centering Light ON button
8	Left Breast selection	19	Exposure interrupt indicator button
9	Right Breast selection	20	Prep button
10	Special Views selection	21	Exposure button
11	kV and mAs readout display	22	Compression Release button

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1. System power on switch I

- Press this button to power on the Gantry and Generator and other system components; the indicator lamp lights and the system startup procedure begins. The X-ray Console displays the last configuration used.

**2. Gantry/Generator power off switch STOP or **

Press this button to power off the Gantry and Generator; the indicator lamp lights.

Note:

For more information on startup and shutdown procedures, refer to Chapter 6 *Startup and Shutdown*.

3. Setup button

- Press this button to access X-ray Console setup functions; language selection, Medical Setup menu, and view selection for recumbent patients. Refer to section 3 *X-ray Console setup menus on page 37* for more information.

4. Readout display

The readout displays two lines of up to 40 characters.

- The upper line displays information, safety, and error messages.
- The lower line displays selected parameters: focal spot, focal track, filter, breast laterality, view names, presence of magnification, and arm rotation angle.

5. Focal Spot selection button

- Press this button to toggle between small or large focal spot (0.1 or 0.3, respectively). The readout indicates the size of the selected focal spot.

Note:

This selection is normally made automatically. By default, the system selects the large focal spot when no magnification stand is present, and the small focal spot when a magnification stand is installed. The selection can be changed manually, but exposures are not possible when the automatic setting is overridden.

6. Focal track selection button

- Press this button to switch between the two anode tracks; molybdenum (Mo) and rhodium (Rh).
 - In Manual mode**, press the button to select the anode track. The readout indicates the track selected.
 - In AOP (Automatic Optimization of Parameters) mode**, selection is automatic, and pressing the button has no effect.

7. Filter selection button

- Press this button to switch between the two filters, molybdenum (Mo) and rhodium (Rh).
 - In Manual mode**, press the button to select the filter. The readout indicates the filter selected.

Note:

Certain filter/anode track pairs are inhibited, according to the selected kV value. The system automatically selects an authorized filter and displays the selection.

- In AOP mode**, filter selection is automatic, and pressing the button has no effect.

8. Breast laterality - Left button

- When acquiring an image, press this button to indicate that a LEFT breast is being imaged.

9. Breast laterality - Right button

- When acquiring an image, press this button to indicate that a RIGHT breast is being imaged. Note that selection of breast laterality (left or right breast) is mandatory. If laterality is not selected by the operator, the exposure command is disabled.

10. Special views selection (for standing or sitting patients) button

View names are normally determined automatically; the view names used are based on the ACR view name convention; see section [4 View Name selection on page 39](#) for more information. This button is used to modify the view name if a special view is used.

- Automatic view selection:**
After the operator selects breast laterality, the system determines and displays the correct view name according to the Gantry arm angle. View names selected automatically are: RCC, LCC, RMLO, LMLO, LSIO, RSIO, LML, RML, LLM, RLM, LLMO, RLMO, LFB, RFB.
If magnification is in use, the letter M is automatically added to the view name after the laterality letter (e.g., LMCC for a mag view on the left breast in the CC position).
- Special view selection (for standing or sitting patients):**
When a special view is used which does not correspond to the automatic view selection, press the *Special Views* selection button as often as required until the desired view name is displayed. Refer to section [4 View Name selection on page 39](#).
- Recumbent patients:**
The automatic and special view selection procedure applies only to standing or sitting patients. View names for recumbent patients (patients unable to stand or sit for the mammogram) are selected using the **Recumbent Patient** menu as described in section [4-5 View names for recumbent patients on page 41](#).

11. kV and mAs Readout display

- In Manual mode** the readout displays the kV and mAs values selected by the operator.
- When an AOP mode is selected**, the kV readout displays the code of the selected mode: CNT (Contrast), STD (Standard), or DOSE. The mAs readout displays AUTO.
- At end of exposure**, the kV readout displays the kV value selected and used during the exposure and the first letter of the code of the selected mode (CNT, STD, or DOSE); the mAs readout displays the mAs value used during the exposure.

12. kV selection knob

- In Manual mode**, turn the kV knob to select the required kV value; the displayed value changes as the knob is turned. Available values are 22 kV through 49 kV in steps of 1 kV. There is no mechanical stop; you can continue to turn the knob past the minimum or maximum value (22 kV or 49 kV), but the displayed value no longer changes.
- In AOP mode, turning** the knob has no effect.

13. mAs selection knob

- In Manual mode**, turn the mAs knob to select the required mAs value; the displayed value changes as the knob is turned. Available values are 4 mAs through 500 mAs, but some parameter selections may change these limits, e.g. the X-ray Console can display as high as 600 mAs whereas the exposure is automatically limited to 500 mAs. There is no mechanical stop; you can continue to turn the knob past the minimum or maximum value, but the displayed value no longer changes.
- In AOP mode**, turning the knob has no effect.

14. AOP and Manual mode selection button

Press the button to step through the four possible modes; three AOP modes and Manual mode.

- **Three AOP modes** are available, according to the **priority** required:
 - CNT:** Contrast. Priority is given to optimum subject contrast, while minimizing patient dose.
 - STD:** Standard. Gives a compromise between good contrast and dose reduction.
 - DOSE:** Dose. Priority is given to dose reduction, with acceptable image quality.
- At the start of compression, the selected priority code is displayed on the kV readout. When the exposure is complete, the initial letter of the code selected is displayed on the kV readout.
- **Manual mode** is used to allow manual selection of kV and mAs values.



Breast compression is essential when using the AOP mode. Refer to the Caution on use of compression in the AOP section of Chapter 12 *Image Acquisition Procedure*.

15. Exposure enable lamp

- When this lamp is lit, exposure is enabled.

16. Exposure indicator lamp

- This lamp is lit from the start to the end of an exposure.
- A buzzer sounds at the end of exposure.

17. Exposure disable lamp

- When this lamp is lit, exposure is disabled. Follow the instructions displayed on the left hand section of the console readout.

18. Centering light ON button

- Press this button to switch on the centering light for 45 seconds. The button lights. Note that the centering light does not function when an exposure is initialized.

19. Exposure interrupt button (with indicator lamp).

- Press this button to terminate the current exposure if a problem occurs. The lamp is illuminated and a buzzer sounds. Press the button again to stop the buzzer and reset the system.

20. Prep button with indicator lamp.

- Press this button to prepare the exposure (anode rotation). When the Exposure Enable lamp lights, exposure can be triggered.

Note:

If the Prep button is released before the Exposure Enable lamp is lit, the preparation is cancelled; preparation stops one second after release.

21. Exposure button

- Press and hold this button while the Exposure Enable lamp is lit to make an exposure. To stop the exposure immediately, release the Exposure button.
A buzzer sounds at the end of exposure.

Note:

In AOP mode, and following preparation (anode rotation), exposure is made in two stages:

- An absorption measurement exposure (the "pre-exposure"), to allow selection of the optimum kV, focal track, and filter combination for the chosen priority. These parameters are then set automatically. Maximum pre-exposure time is 70 ms (large focal spot) or 130 ms (small focal spot).
- An exposure during which image acquisition is made.

The operator must maintain pressure on the Exposure button until the buzzer stops to obtain proper exposure.

22. Compression release button

- Press this button to release compression. The compression paddle automatically moves up to the pre-programmed auto-decompression height.

Note:

If auto-decompression is selected in the *medical set up* menu, compression is released automatically at the end of the exposure.

3 X-ray Console setup menus

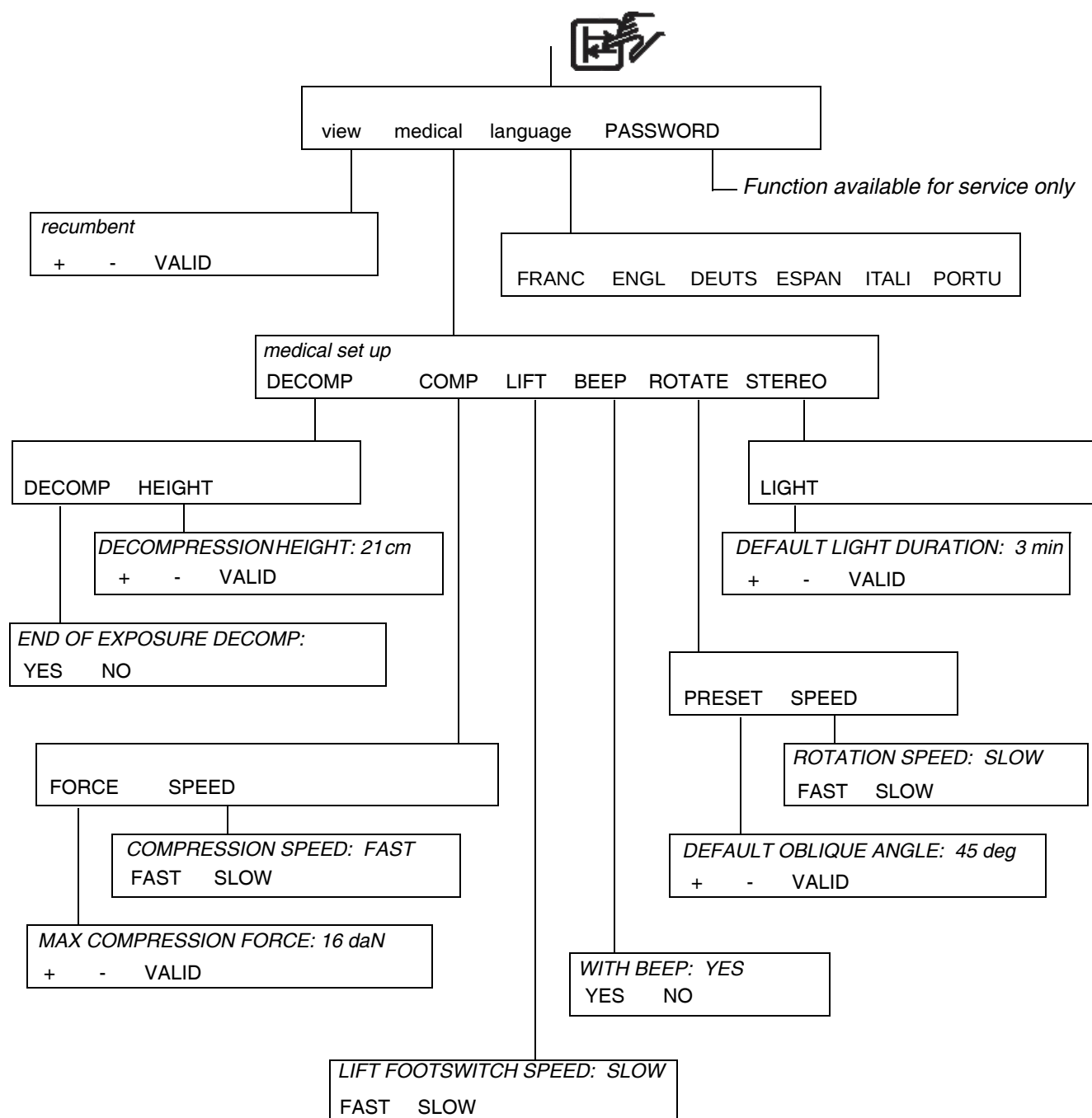
X-ray Console setup menus are accessed by using the console *Setup* button (button 3 in section [2 Console functions on page 32](#)). They allow the user:

- To select the language of the console display.
- To use the *Medical Setup* menu to select operating parameters, including:
 - DECOMP: Decompression: set auto-decompression on/off; set height of decompression.
 - COMP: Compression: set max. compression force; set speed of compression movement.
 - LIFT: Lift speed of movement; select fast or slow.
 - BEEP: Beep on key press: select on or off.
 - ROTATE: Rotation: set default oblique angle; set speed of rotation.
 - STEREO: Light duration (for stereotaxy operations only): set the default light duration.
- To select a desired view name when working with a recumbent patient.

Refer to the menu diagram in section [3-1 Access to setup menus on page 38](#) for information on using the menus.

3-1 Access to setup menus

- With the X-ray Console in normal application mode, press the **Setup** button to enter the "menu tree" shown below.
- To access a function, press the button below the displayed name of the function.
- To back out of a function (move "up the tree"), press the **Setup** button again.



4 View Name selection

- View names (Projection Position Codes) used by the Senographe DS system are described below in section [4-1 .View names on page 39](#)
- View names are normally selected automatically, according to the selected laterality, the presence or absence of a magnification stand, and the gantry angle, as described in section [4-2 Automatic view name selection on page 40](#).
- For views which do not correspond to the automatic selection, the operator must select additional information manually, as described below in sections [4-4 Manual view name selection \(standing or sitting patients\) on page 41](#) and [4-5 View names for recumbent patients on page 41](#).

4-1 .View names

View names used by the Senographe DS system are shown here. They are based on the ACR (American College of Radiology) standardized abbreviations for mammography projection position codes.

Description	Code	Comment
Prefixes selected by operator (laterality):		
Right	R	Laterality selected by operator
Left	L	Laterality selected by operator
Prefix selected automatically (magnification):		
Magnification	M	Selected automatically if a Mag. stand is present
View Names selected automatically (applicable only to standing or sitting patients):		
CranioCaudal	CC	Inferior side of breast against receptor
MedioLateral Oblique	MLO	Inferior lateral side of breast against receptor
MedioLateral (90°)	ML	Lateral side of breast against receptor
LateroMedial (90°)	LM	Medial side of breast against receptor
LateroMedial Oblique	LMO	Superior medial side of breast against receptor
CaudoCranial (from below)	FB	Superior side of breast against receptor
Superolateral to Inferiomedial Oblique	SIO	Inferior medial side of breast against receptor
View Names selected manually:		
Exaggerated CranioCaudal	XCCM	As CC with patient rotated medially
Exaggerated CranioCaudal	XCCL	As CC with patient rotated laterally
Cleavage	CV	As CC but inferior side of both breasts against receptor
Axillary Tail	AT	As MLO; axillary breast medially and anteriorly onto receptor
Suffixes selected manually:		
Implant Displaced	ID	Implant pushed back and flattened against chest wall
Tangential	TAN	Area of interest projected close to skin surface
Spot Compression	S	Spot compression with or without magnification
Roll Lateral	RL	Roll the breast slightly in lateral direction
Roll Medial	RM	Roll the breast slightly in medial direction

Prefixes and suffixes are used with the main view names; for example, RMMLO equals Right Magnified MedioLateral Oblique, and LCCRL equals Left CranioCaudal with upper breast tissue Rolled Laterally.

4-2 Automatic view name selection

Laterality

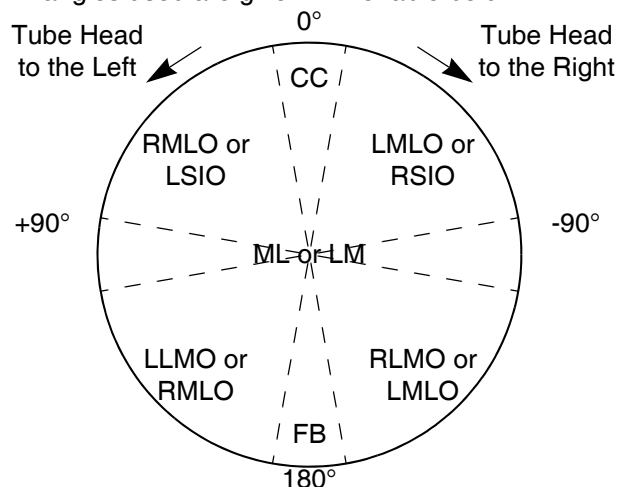
The operator selects the breast laterality, Left or Right.

Magnification

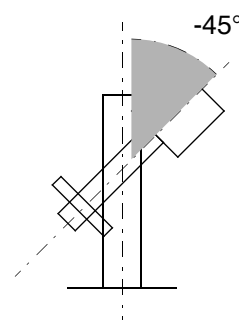
The system senses the presence or absence of a magnification stand

Arm rotation angle

The system selects a view name according to the arm angle and the laterality. Default values for the angles used are given in the table below.



Arm angles are measured from the vertical 0° position, with positive angles counter-clockwise when facing the Gantry. The sketch shows the tube at -45°.



- Example:
Operator selected laterality: R.
Magnification stand: Present
Tube angle: -45°

The tube is at -45° and the selected laterality is R, so the inferior side of the breast is against the receptor. The system therefore selects the view name **SIO**, and adds the laterality prefix R. Because a magnification stand is present, it also adds the prefix M.

Automatically selected view name: R M SIO

4-3 Angles used in automatic view selection

The table shows the values used for automatic view selection:

View Name Selected	Tube Head to Left		Tube Head to Right	
	Minimum	Maximum	Minimum	Maximum
CC	0°	+10°	0°	-10°
MLO or SIO	+11°	+79°	-11°	-79°
ML or LM	+80°	+100°	-80°	-100°
LMO	+101°	+169°	-101°	-165°
FB	+170°	+185°	not accessible	

4-4 Manual view name selection (standing or sitting patients)

- If a special view is being used which does not correspond to one of the view names selected automatically, use the *Special Views* selection button (button 10 in section [2 Console functions on page 32](#)) to modify the view name. Press the button as often as required until the correct modified name is displayed. There are two types of modifier:
 - *Modifiers which are added as a suffix:*
ID, TAN, RL, RM, S (e.g., RCC becomes RCCRM).
 - *Modifiers which replace the standard view names:*
XCCL, XCCM, or CV replace CC or FB.
AT replaces MLO.

Note:

When the patient is positioned for a Cleavage view (CV), external markers must be used to assist in determining laterality when viewing the image. Place a Right (R) or Left (L) marker in the lateral aspect of the breast of interest, or place markers on the lateral side of each breast. Markers must be placed outside of the 140 mm x 160 mm ROI used by AOP (see Chapter [12 Image Acquisition Procedure](#)).

4-5 View names for recumbent patients

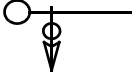
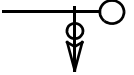
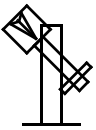
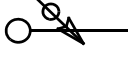
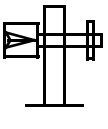
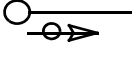
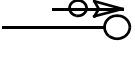
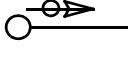
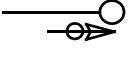
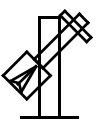
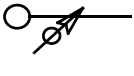
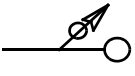
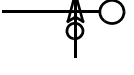
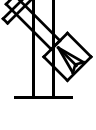
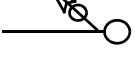
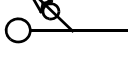
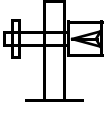
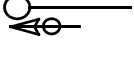
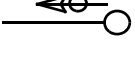
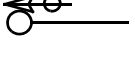
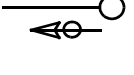
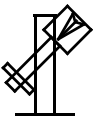
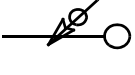
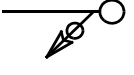
For patients unable to stand or sit for the mammogram, the change of view imposed by the recumbent position means that the automatically selected view name is not correct.

View names for recumbent patients are selected on the X-ray Console **Recumbent Patient** menu, accessed by using the *Setup* button as described in section [3 X-ray Console setup menus on page 37](#). The diagram given on the following page is intended as an aid in selecting appropriate view names for use with recumbent patients.

Each row of the diagram starts with a sketch showing the tube position for one of the main tube angulations. It then gives, first for the Left breast, then for the Right breast:

- The view name corresponding to that angulation for a standing patient. This is the view name which is automatically selected and displayed by the system.
- A sketch showing the path of X-rays through the breast of a recumbent patient with her head to the left, with the corresponding view name. In the **Recumbent Patient** menu, press the - button as often as required until this view name is displayed.
- A sketch showing the path of X-rays through the breast of a **Recumbent Patient** with her head to the right, with the corresponding view name. In the **Recumbent Patient** menu, press the + button as often as required until this view name is displayed.

In each sketch the patient is shown from the rear.

Tube Tube angulation	Patient					
	Left Breast			Right Breast		
	Automatic view name selection	Recumbent view		Automatic view name selection	Recumbent view	
		Head to Left	Head to Right		Head to Left	Head to Right
	LCC	LML 	LLM 	RCC	RLM 	RML 
	LSIO	LMLO 	LLMO 	RMLO	RSIO 	(RMLO) 
	LLM	LCC 	LFB 	RML	RCC 	RFB 
	LLMO	LSIO 	(LMLO) 	(RMLO)	RMLO 	RLMO 
	LFB	LLM 	LML 	RFB	RML 	RLM 
	(LMLO)	LLMO 	LMLO 	RLMO	(RMLO) 	RSIO 
	LML	LFB 	LCC 	RLM	RFB 	RCC 
	LMLO	(LMLO) 	LSIO 	RSIO	RLMO 	RMLO 

View names displayed in parentheses, e.g. (RMLO), are not used for medical purposes.

Chapter 5 Control Station

1 Overview

1-1 Introduction

The Control Station provides the following functions:

- Image acquisition from the Digital Detector
- Image display and manipulation
- Management of Patient information and the Exam Database
- Image transfer to other workstations using the DICOM standard
- Filming of images (on optional laser printer)
- Archiving images (on optional mass archiving system)
- Saving of images on recordable CD-ROMs (if the CD-R Interchange Media option is present)

Senographe DS applications are based upon a graphical, multi-window, mouse- or trackball-driven interface. Images, lists, menus, and control panels are displayed within graphical windows on the Workstation monitor. Selections are made using on-screen buttons, menus and control panels, etc., by pointing and clicking with the mouse or optional trackball.

CAUTION

Software programs other than those supplied by General Electric Medical Systems specifically for use with this system must NOT be loaded onto the system.

1-2 Control Station Hardware

The Senographe DS Control Station comprises:

- A computer unit (with internal hard disk unit for system software and image storage), housed inside the cabinet.
- A user interface, called AWS, which includes a monitor, alphanumeric keyboard, and a mouse or optional trackball pointing device for operator interaction with the computer unit.
- A radiation screen mounted on the cabinet. The X-ray Control Console may be mounted on top of the cabinet.

CAUTION

To reposition the monitor (to move it forward, backwards or rotate around the lead glass shield) only use the handle to avoid being pinched.

! Notice:

The monitor should be used in a suitably dark environment when reviewing a digital image. The maximum recommended ambient light level is 50 lux.

WARNING

The AWS monitor must *not* be used for final interpretation of examinations.



2 Startup and Shutdown

- Refer to Chapter 6 [Startup and Shutdown](#) for power up and power down procedures.

3 Hardware controls

3-1 Pointing devices

3-1-1 Introduction

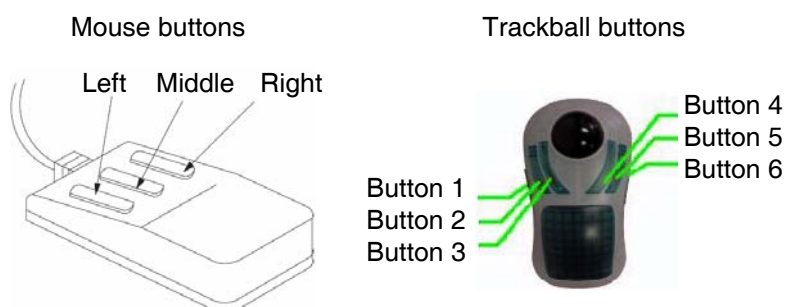
The Senographe DS is supplied with a mouse or trackball pointing device, which allows you to select and interact with items displayed on the monitor.

A mouse is supplied as standard, but a trackball is available as an option. Both are hand-operated devices which are used to move the cursor (an on-screen arrow or other symbol; see section [5-1 Cursor on page 46](#)) across the monitor screen. For instance, moving the mouse to the right, or rolling the trackball to the right, causes the cursor to move to the right, and so on. Both devices include buttons for selection and interaction with on-screen objects.

3-1-2 Mouse and trackball buttons

Throughout this manual instructions for use of buttons on the pointing device refer to them as if they were mouse buttons, named left button, middle button, and right button. This is done because most users are familiar with the use of a mouse, and because trackballs can be configured in different ways. The illustrations and table below show the correspondence between mouse buttons and trackball buttons as configured for the Senographe DS:

Mouse button	Equivalent trackball buttons	
Left button	button 3	button 4
Right button	button 1	button 6
Middle button	button 2	button 5



3-1-3 Using the pointing device

With the cursor positioned on the appropriate object on screen, the left button is used to *select* a window, an on-screen button, or an item in a menu list.

The middle and right buttons are used for specific operations, described in the appropriate sections of this manual.

- "Click" means to press and release a button without moving the cursor.
- "Double-click" means to click a button twice in rapid succession.
- "Press and drag" means to move an item across the screen. With the cursor on the item, press and hold the appropriate button while moving the mouse or rolling the trackball, "dragging" the selected item.
- "Drag and drop" means to drag an item and "drop" it in a new location. Drag the item as described above ("press and drag"), then drop it in the required position by releasing the button. Specific "drag and drop" operations are described in more detail in the appropriate sections of this manual.
- Important:** "Clicking the mouse button", "pressing a button", "selecting a menu item", etc. in this manual always refer to using the left mouse button, unless the middle or right mouse button is specifically mentioned.

3-2 Keyboard

The keyboard is used for entering text at on-screen prompts and alphanumeric data in data entry fields. Use the *Delete* or *Back Space* key to erase entered text or data.

The use of the *Shift* and *Control* keys is described in the appropriate sections of this manual.

**Notice:**

To avoid the possibility of damage to the keyboard slides, do not apply excessive force to the keyboard tray; do not lean on the keyboard or place heavy objects on it.

3-3 Bar Code scanner

A Bar Code scanner can be supplied as an option to allow rapid and accurate entry of patient data in hospitals which provide patient data in this form. Refer to Chapter 9 *Worklist* section 3 *Bar Code scanner (option) on page 91* for more information.

4 Windows

There are several types of windows that will be encountered as you use the Senographe DS AWS. The most important ones are:

- The *Browser*. This is the main window used to manage the database, start the Review application, etc. See Chapter 8 *Browser*.
- The *Worklist* is used to display a list of scheduled operations. From this window you can start image acquisition and review operations. See Chapter 9 *Worklist*.
- The *Viewer* is used by the acquisition and review applications to display and process the images. See Chapter 11 *Viewer*.

These main windows give access to other windows, such as the **Medical Procedure Card** window, the **Annotations** window in the *Viewer*, various user selection windows, etc.

Also, small message windows concerning procedures in progress appear on your monitor as you perform various functions. Some of these disappear on their own, others remain on the screen and the application remains blocked until the message is acknowledged by clicking on *OK* or *Cancel*.

Note:

If the system does not respond because two or more windows are open one on top of another, it is possible to recover by pressing the *Front* key on the keyboard (several times if needed) to access hidden windows.

5 On-screen tools

5-1 Cursor

The cursor is the on-screen symbol, usually an arrow, which you maneuver across the screen using the trackball or mouse, to point to menus, lists, images, and windows.

The cursor changes shape or orientation to indicate a change in function. Some examples:

- When you point to a menu item and click with the left mouse button to open a pull-down menu, the cursor changes to an arrow pointing to the right, to indicate you can now make a selection in the pull-down menu.
- The cursor changes into a watchface if a function that you have selected takes more than a moment to implement; no further function selection is available until the procedure is completed.



Once the procedure is finished, the cursor returns to an arrow shape, indicating that the workstation is ready to accept further input.

5-2 On-screen buttons

Most windows contain on-screen buttons (areas in the form of buttons, containing explanatory graphics or text labels) to activate specific functions. These functions are described in detail elsewhere in this manual. Such buttons are sometimes referred to as *icons*.



To select (or activate) a button, click on it.

When a button's label is shaded grey rather than white, it means that the button's function is currently not available.

Reprocess

5-3 Menus

Certain buttons activate specific functions directly. Others activate drop-down menus that allow you a choice of functions.

To select (or activate) a function in a menu, move the cursor onto the menu item and click. The workstation carries out your command, and the menu disappears.

When a menu item is shaded grey rather than white, it means that the function is currently not available.

5-4 Scroll Bar

A scroll bar is an on-screen tool that you use to page through data that cannot be fully displayed at once on the screen or in a particular window, such as lists of patients or exams in the Browser.

- To move through the data controlled by the scroll bar (images, items in a Browser list, etc.), you can place the cursor on the vertical rectangular bar within the scroll bar. Then, press and hold the left mouse button, and drag the cursor up or down to move backward or forward through the list. The vertical bar within the scroll bar shows you where you are within the list as compared to the list as a whole.

Release the mouse button when the desired data are displayed.



- If you wish to move through the data one item at a time, place the cursor on either the upper or lower arrow and click the left mouse button. Each click moves you up or down by one item of the data.



- If you wish to move through the data one page at a time, place the cursor either above or below the vertical bar and click the left mouse button. Each click now moves you up or down by one page of data.



A scroll bar becomes active only if the display capacity of the list is exceeded. Otherwise, the vertical bar fills the full height of the scroll bar, and clicking on the vertical bar or the arrows has no effect.

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FOR TRAINING PURPOSES ONLY!
NOTE: Once downloaded, this document is UNCONTROLLED, and therefore may not be the latest revision. Always confirm revision status against a validated source (ie CDL).

Chapter 6 Startup and Shutdown

1 Startup procedure

To power up the system, press the power switch **I** on the X-ray Console. Power is applied to the whole system (Gantry, Control Station, Digital Detector, etc.); green power indicators are lit on the Generator, the Control Station, and the monitor.

- A series of system initialization messages appears on the Workstation screen, then the *Login:* prompt is displayed. Type **sd** (all lower case) followed by **<Enter>**. The AWS login screen shown below is displayed after a short delay.



- Enter your user name in *Login ID* field. Then enter your password as provided by the system administrator.

Note:

When the system is delivered two accounts are available:

- A user account; user name **clinical**, password **clinical**.
- An administrator account; user name **admin**, password **admin**.

2 System Shutdown

Note:

It is recommended that the system should be shut down at the end of every working day.

To power down the system, click the System Shutdown button  on the Browser window. A confirmation message is displayed asking if the entire system should be shut down. If your response is **Yes**, power is removed from the Senographe DS Gantry and other system components, while the Control Station begins a controlled shutdown, designed to safeguard data. Complete system and UPS shut down takes about two minutes from switch-off.

! Notice:

The Control Station follows an automatic shut down procedure which protects image and patient data. No prompts are displayed. Do not disturb this procedure by attempting to enter commands at this time.



NEVER switch off at the UPS (Uninterruptible Power Supply) except in emergency (risk of data loss).

3 Emergency Stop Motion or Shutdown

- **In an emergency, to stop Gantry motion:** Press one of the Emergency Stop Motion push-buttons; there is one on each side of the Telescopic Column.
- **In an emergency, to cut power to all system components:** Switch off the main circuit breaker that supplies power from the hospital system to the Senographe DS system. All image and patient information being processed at the time is lost, and the Conditioner which controls the Digital Detector environment is switched off.

See also Chapter 1 [Safety Recommendations](#) section 3 [Emergency Stop Motion and Shutdown on page 13](#).

4 Gantry Reset

Certain configuration operations require the Gantry to be switched off and restarted. It is usually desirable to reset the Gantry without disturbing the operation of the Control Station.

- To do this, switch off the Gantry and Generator by pressing the X-ray Console power switch labelled **STOP** or . Switch them on again by pressing the power switch I.

5 Generator Cabinet push-buttons

Push-buttons mounted on the Generator cabinet control power to the AWS **Cabinet** and to the **UPS**. They are provided for service and emergency use; they should not be used in normal operation.

Chapter 7 User Session and Account Management

1 Introduction

The word "user" belongs to network access management vocabulary and is synonymous with "Operator" used elsewhere in this manual.

When several users work regularly on the same Senographe DS workstation, the system can be set up to provide a separate access for each user.

If a system has been set up for multiple users, certain tasks need to be performed regularly, such as management of the list of authorized users, definition of password policies and management of auto-log-off delays.

To ensure correct coordination, a single person (the *Administrator*) should normally perform these tasks.

Note:

The Administrator may be the data processing manager for the site, the IT coordinator, or an experienced user. A single user on an individual workstation may act as his or her own Administrator.

Note:

When the system is delivered two accounts are available:

- A user account; user name **clinical**, password **clinical**.
- An administrator account; user name **admin**, password **admin**.

You are recommended to proceed immediately to set up new accounts with new passwords, as described in the following sections.

2 Opening an administrative session

To open an administrative session:

- Power up the system and type **sd** at the login prompt, or logoff from your current session to return to the AWS login screen.
- At the login screen (see Chapter 6 *Startup and Shutdown*, section 1 *Startup procedure on page 49*) log in as *admin*. The factory-set default password for *admin* is *admin*.

! Notice:

For added security, it is strongly recommended that the designated Administrator should change the default password at the first login.

- The user administration application starts. The available options are selected by clicking the tabs along the top of the screen.
- By default, the tab *Local User Management* is selected when an administrative session is opened, as shown below:

GE Healthcare			
Local User Management Group and Permission Mapping Configuration Log Viewer			
	group1	group2	group3
myusername	☒	☐	☐
nick	☐	☒	☐
john	☐	☐	☐
sue	☒	☒	☐
angela	☐	☐	☒

User settings applied

☐ Show protected users

2-1 Users Management: Creation, Deletion, Password Modification, Setting Application

The Senographe DS has several different types of users: clinical users, administrator users and GE representative users. Only clinical users can be managed by the system administrator. Clinical users can access the medical application, perform acquisitions, and more generally have access to patient data stored locally on the system.

- To create / delete a clinical user, to change his/her password or to apply his/her settings, first open an administrative session and display the default option *Local User Management* (see section [2 Opening an administrative session on page 52](#)).

2-1-1 Creating an user

To create a new user:

- Click **Add User** button and fill-in the fields at the bottom of the screen:
 - *Username*: enter the name that user would like to type to log in the system (e.g. "pam")
 - *First name* and *Last name*: enter user information (e.g. "Pamela" and "Andersen")
 - *Password*: enter password chosen by this user
 - *Confirm password*: enter again the same password
- Click the **Submit** button.

The screenshot displays the 'Local User Management' window in the GE Healthcare software. The window has a title bar with 'GE Healthcare' and a menu bar with 'Local User Management', 'Group and Permission Mapping', 'Configuration', and 'Log Viewer'. The main area is a large, empty light gray rectangle. At the bottom, there is a form with the following fields and buttons:

- Username**: A text box containing 'pam'.
- First Name**: A text box containing 'Pamela'.
- Last Name**: A text box containing 'Andersen'.
- Password**: A text box with masked characters '****'.
- Confirm password**: A text box with masked characters '****'.
- Submit** and **Cancel** buttons are located below the password fields.
- An **Exit** button is located at the bottom center of the window.

2-1-2 Deleting an user

To delete an user:

- Select the user you want to delete in the displayed list.
- Click the **Remove User** button at the bottom of the screen (not active if no user is selected) and confirm by clicking **Remove Now** button.
The user is deleted from the list.

2-1-3 Changing user password

To change a user password:

- Select the concerned user then click **Change password** button.
- Enter the new password in the *New password* field.
- Confirm the new password by entering it again in the *Confirm password* field, then click **Submit** button.

The screenshot displays the 'Local User Management' window with the 'Configuration' tab selected. It features a table of users and their group memberships, and a form at the bottom for changing a user's password.

	group1	group2	group3
myusername	☒	☐	☐
nick	☐	☐	☐
john	☐	☒	☐
sue	☐	☐	☐
angela	☐	☐	☐

At the bottom, the 'Change password' form is visible with the following fields and buttons:

- Username: john
- New password: *****
- Confirm password: *****
- Buttons: Submit, Cancel, Exit

2-1-4 Applying setting to an user

- Select the concerned user.
- Check group box(es) for this user, depending on which group(s) you want the user to belong to. Users can belong to any number of groups (including no group).
- Click **Apply user settings** button then **Apply now** button
The administrative session is only available to those users who belong to groups that have 'Administrator' or 'GEService' permissions. As a consequence:
 - users who don't belong to one of this group cannot change their permissions by their own.
 - after settings are completed, if you have both Administrator permissions and another permission, you are asked if you want to login to the system or to the administrative session.The permission levels for a user is the union of permission levels of all the groups he or she belongs to.

2-2 Group Management: Creation, Deletion and Setting Application

- To create, delete or apply settings to a group, first open an administrative session and display the second tab *Group and Permission Mapping*.

	GEService	Administrator	StandardUser	LimitedUser
group1				
group2				
group3				

☐ Show protected groups

2-2-1 Creating a group

To create a new group:

- Click **Add Group** button.
- Label the new group to be created.
- Click **Add Local Group** button.

	GService	Administrator	StandardUser	LimitedUser
group1	☐	☒	☐	☐
group2	☐	☐	☒	☐
group3	☐	☐	☐	☒

Group name cannot be empty

Group name to add:

2-2-2 Deleting a group

To delete a group:

- Select the group you want to removed.
 - Click the **Remove Group** button at the bottom of the screen (not active if no user is selected) and confirm by clicking **Remove Now** button.
- The group is removed from the list.

2-2-3 Applying setting to a group

- Select the concerned group
- Check permission box(es) for this group, depending on which permission(s) you want to affect to it: *Administrator*, *StandardUser*, *LimitedUser*.
Groups can have any number of permissions (including no permissions).

**Notice:**

GEService permission is not to be used by clinical users.

- Click **Apply group settings** button then **Apply now** button.

	GEService	Administrator	StandardUser	LimitedUser
group1	☐	☒	☐	☐
group2	☐	☐	☒	☐
group3	☐	☐	☐	☒
group4	☐	☒	☒	☐

Apply group settings

Apply now Cancel

Exit

3 Configuration Options

To set up configuration options:

- First open an administrative session and display the third tab *Configuration*:
- You can set up the amount of time for the login screen to re-appear if there has been no mouse key-board movement. The value (in minutes) is to be entered in the field labelled *Inactivity Timeout*.

Note:

Be aware that a value of 0 indicates 'no' inactivity timeout (e.g. even with infinite inactivity, the log-on screen will never appear after the initial login until there is a logout or a reboot).

- If you want an emergency login to be available for users, then check *Display Emergency Button* box.

GE Healthcare

Local User Management | Group and Permission Mapping | **Configuration** | Log Viewer

Configuration

Inactivity Timeout (minutes) 15

☒ Display Emergency Button

☐ Display Emergency Prompt

☐ Cache Enterprise Users

☐ Enable Enterprise Authentication

☐ Enable Authorization

Apply Configuration Restore

If *Display Emergency Button* box is checked, then login screen will display as:

GE

Login ID:

Password:

Emergency Login

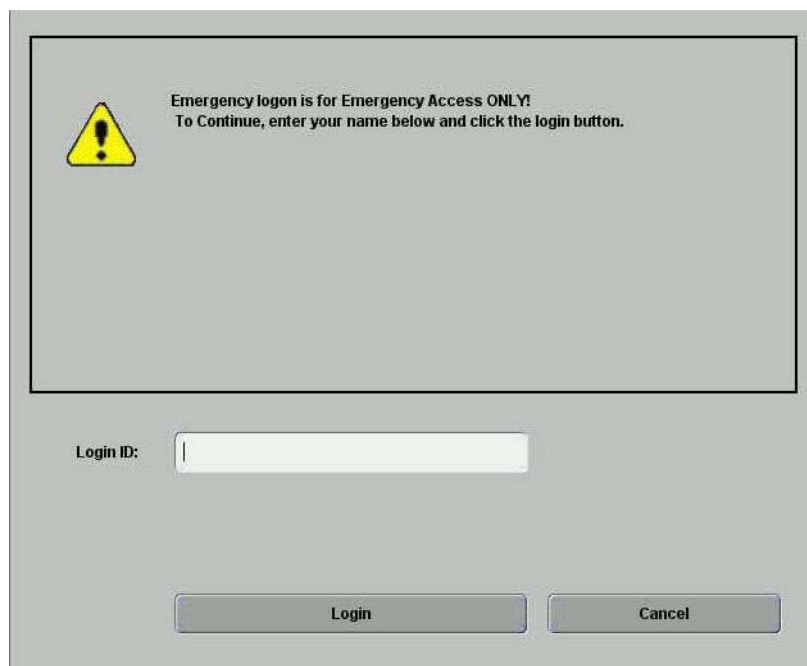
Login Cancel

User Session and Account Management

In that case, you can also choose whether the system shall prompt for information, at emergency login, about who the user is, or not.

- To have the prompt displayed, check *Display Emergency Prompt* box in addition to *Display Emergency Button* box.

At login, users who choose emergency login will have to enter information into a text box:



Cache Enterprise Users and *Enable Enterprise Authentication* boxes are grayed as they do not apply for current system. *Enable Authorization* box, even if not grayed, does not apply for current system either.

4 Reading access control log files

Each login attempt of the Senographe DS is logged by the workstation. The administrator can access these log files.

4-1 Viewing the log files

To access the log files:

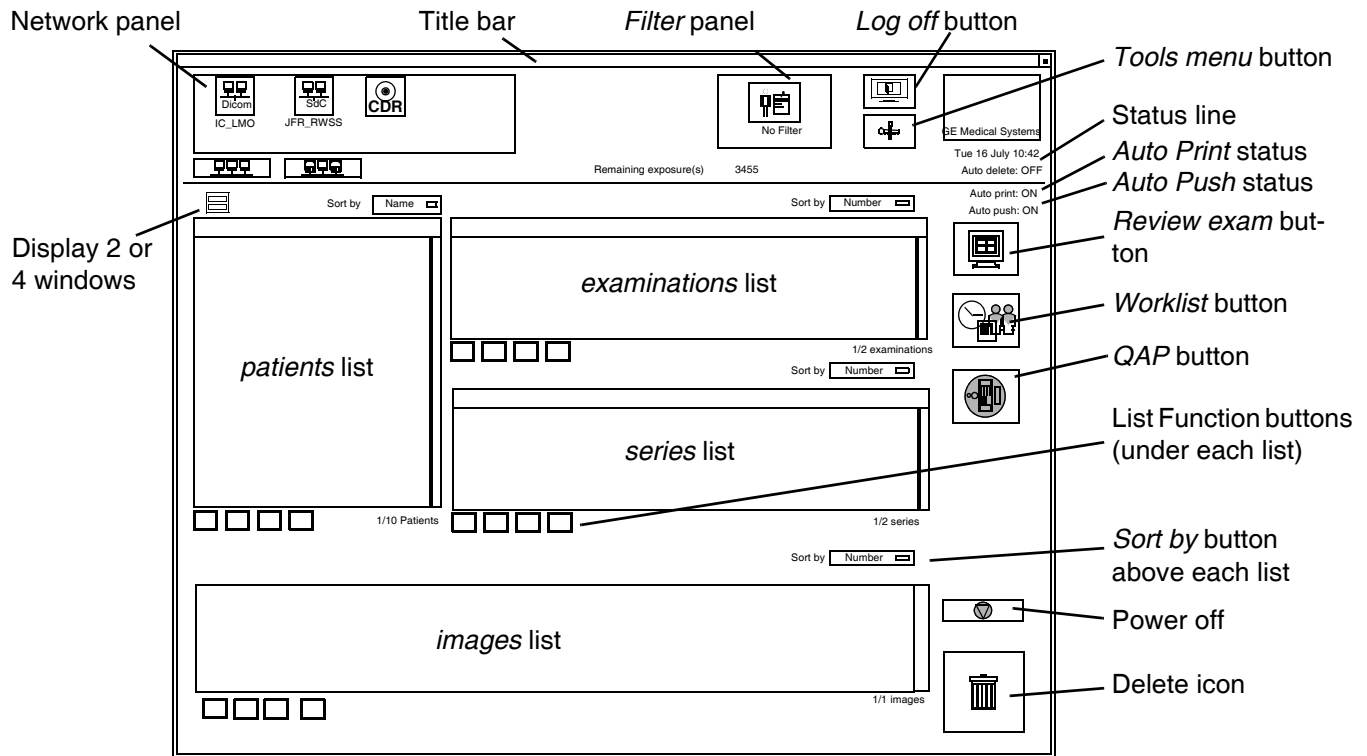
- First open an administrative session and display the default option *Local User Management* (see section [2 Opening an administrative session on page 52](#)).
- Select the *Log Viewer* tab to display the log file screen shown below. The screen shows a list of all login attempts.
- Use the scroll bar to navigate the log file.

GE Healthcare								
Local User Management Group and Permission Mapping Configuration Log Viewer								
View the last 100 records in the log. Refresh								
EventDate	Time	EventOutcomeIndicator	Event ID	UserID	UserName	AuditSourceID	Host	AppName
Thu May 03 10:57:57 ...	Success	Local Authentication	admin		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:56:28 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:55:17 ...	Success	Local Authentication	admin		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:53:41 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:53:08 ...	Success	Local Authentication	admin		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:50:59 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:50:30 ...	Success	Local Authentication	admin		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:48:15 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:46:31 ...	Success	Local Authentication	admin		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:42:55 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:42:28 ...	Success	Local Authentication	admin		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:42:24 ...	Failure	Local Authentication	admin		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:42:01 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:41:52 ...	Success	Local Authentication	admin		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:41:43 ...	Success	Local Authentication	admin		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:37:13 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:35:48 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:11:19 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:05:06 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Thu May 03 10:02:10 ...	Failure	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Thu May 03 09:36:12 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Thu May 03 09:18:00 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Wed May 02 17:05:40 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Wed May 02 16:01:34 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Wed May 02 14:49:48 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Wed May 02 13:16:05 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Wed May 02 09:44:38 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Mon Apr 30 15:06:54 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Mon Apr 30 14:17:00 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Mon Apr 30 13:55:16 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Mon Apr 30 12:06:49 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Mon Apr 30 11:16:52 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Mon Apr 30 10:30:06 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Fri Apr 27 17:04:51 G...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Fri Apr 27 15:41:01 G...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Fri Apr 27 15:40:59 G...	Failure	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Fri Apr 27 14:45:17 G...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Fri Apr 27 11:19:47 G...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Fri Apr 27 10:55:07 G...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Fri Apr 27 10:36:14 G...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Thu Apr 26 18:52:00 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	
Thu Apr 26 18:11:30 ...	Success	Local Authentication	clinical		3,249.12.200	adspc008	ea3Pam	

Exit

This page is blank.

Chapter 8 Browser



1 Overview

The Browser window illustrated above (usually simply called "the Browser") is displayed when the Senographe DS system is first switched on. Note that the Tools menu function (section [8 Tools menu utilities on page 72](#)) allows a number of Browser display options, so the windows and icons displayed may differ from that shown here.

The Browser is used to:

- Shut down the Senographe DS system.
- Link with the HIS/RIS (Hospital/Radiology Information System).
- Access the Worklist for setting up and starting patient examinations.
- Select images in the workstation database for review.
- Manage the database (in particular to remove images that are no longer required).
- Transfer images to other workstations.
- Save images on recordable CDs for data interchange.
- Archive images (if the optional mass archiving system is present).

2 Browser restart

If it is necessary to restart (reset) the Browser, proceed as follows:

- Place the cursor in the title bar at the top of the Browser window.
- Use the left mouse button to drag the window down, leaving a blank space on the screen above the window.
- Place the cursor in the blank space; click the right button.
- Select **Restart Browser** from the drop-down menu.

If *Network*, *Printing*, or *Save* operations are in progress, a warning box is displayed, allowing you to proceed with the restart or to cancel it. Jobs in progress are interrupted and may be lost when the Browser is restarted. Network transfers are stopped, but are automatically retried after the restart. Printing and save operations are stopped, and must be launched again after the restart. Note that interrupted save operations to a CD-R may result in a partially saved file on the disk; the disk will be unusable and must be replaced before the operation is repeated.



3 System Shutdown

- To shut down the Senographe DS system, click on the **Power off** icon  at the lower right of the Browser window. Power is removed from the Senographe DS Gantry and Generator; the Control Station follows a shutdown procedure lasting about two minutes, designed to ensure that no information is lost.

4 Log off

- This function may be used to prevent access by unauthorized persons to the system and locally stored patient data, especially between two acquisitions.
- To use the function, click the **Logoff** button icon at the top right of the screen. The system returns to the login screen (see Chapter 6 *Startup and Shutdown*, section 1 *Startup procedure on page 49*). Follow the usual login procedure to resume operation.
- The system administrator can configure the system to log off automatically after a chosen delay.



5 Browser display

5-1 Date Display

The date displayed on Browser is in English, regardless of the language of the system. The format of displayed date is the month (first three letters), the day (two digits) and the year (four digits), i.e.: MMM DD YYYY. The following table gives the English abbreviations of month names:

Month	English Abbreviation
January	Jan
February	Feb
March	Mar
April	Apr
May	May
June	Jun
July	Jul
August	Aug
September	Sep
October	Oct
November	Nov
December	Dec

5-2 Lists

The Browser contains lists showing the patients, examinations, series, and images presently on the image disk:

- Patients list: Patients for whom examinations are stored on the image disk.
- Examinations list: Examination for the selected patient.
Note: examinations are sometimes referred to as studies.
- Series list: The different series of images within the selected examination; Raw, Processed, and Screen Save images.
- Images list: Images within the selected series.

The number of items (patients, examinations, series, or images) currently selected, and the total number of items contained in the list, is displayed at the lower right corner of each list.

In addition to raw and processed images acquired locally by the AWS, the Browser lists may also include SCPT (Secondary Capture) images.

5-3 List format

- The Browser displays lists of patients, exams, etc., in two formats:
 - Two-list format; patients, and examinations.
 - Four-list format: patients, examinations, series, and images.



- To change from one format to the other, click the appropriate small icon just above the patients list.

5-4 Application controls

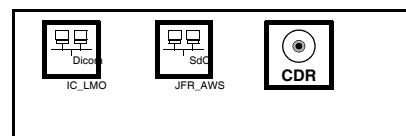
The application control buttons to the right of the Browser lists are used to review images stored on the workstation database, to start Quality Assurance Procedures (QAP), or to input patient demographics from the HIS/RIS.

- To review images stored on the workstation: select the desired images on the Browser, then click on the **Review exam** button.
- To link with the HIS/RIS and access the Worklist management function: click on the **Worklist** button.
- To start Quality Assurance Procedures: click on the **QAP** button; select the required procedure from the list presented. Refer to the Senographe DS Acquisition QC Manual for more information on starting and using the Quality Assurance Procedures.



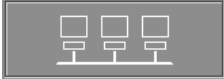
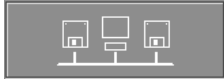
5-5 Network panel

The Network panel at the top of the Browser displays icons representing the remote hosts and storage devices (such as CD-R) currently connected to your workstation. See section [7 Network transfer on page 70](#) for more information.



5-6 Status display

Icons and text on the Browser Status line give status information. Not all icons are present at any one time, depending on the installed options and current operations. Possible status indications are, from left to right of the screen:

- *Network status.* A dot moving along the lower line indicates that a network transfer is in progress. 
- *Media transfer status.* A dot moving along the lower line indicates that a media transfer operation (e.g., to or from CD-ROM) is in progress. 
- *Database query.* If present, this icon indicates that a query is in progress (local hard disk access). This icon may appear only very briefly. Any error messages that may result from a database query are also displayed in this position. 
- *Filter indicator.* If present, this icon indicates that a filter is currently applied (see section [9 Filters on page 82](#)). Click on the indicator to display the current local filter window. 
- *Current date and time and Auto Delete status.* Shown in text form just below the GE logo at the right of the screen. The status of the Auto Print, Auto Push, and Auto Delete options is also shown (*ON* or *OFF*). Auto Delete should normally be *OFF*.
- *Disk space available* is shown as the number of remaining exposures. Note that each exposure includes two images (raw and processed).

6 Browser management

6-1 Viewing items in lists

If more items are present in a list than can be displayed at one time, use the scroll bar on the right of the list to move through the items in the list (see Chapter 5 *Control Station* for information on how to use the scroll bar).

An arrow button beneath a list indicates that more columns of information may be available; click on the button to view the additional information. 

6-2 Selecting images

To work with the images stored on the Workstation database (image review, network transfer, etc.), first select the desired images on the Browser. Select in turn the desired patient, study, and series, by clicking on them. Each selected item is highlighted.

When any image is selected, all images of the series that includes the selected image are loaded and displayed.

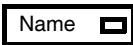
6-3 Status of series

The Status column in the Series list is used for single letter flags which indicate the status of the series:

- A Archived (storage commitment received from a mass archive system).
- C Copied onto CD-R media.
- P Sent to a printer (this does not guarantee that the image(s) have been printed).
- S Sent to a network entity.
- L Locked. Click on the **Lock** button  to lock an item.
- U Unlocked. Click on the **Unlock** button  to unlock an item.
- * In use (being reviewed, archived, or transferred).
Images from in-use studies cannot be removed.

6-4 Sorting lists

To sort the items in the lists according to different criteria:

- Click on the **Sort by** button above the list you want to sort, then select the desired sorting option in the drop-down menu. Sort by: 
 - Patient lists can be sorted by: *Identifier, Name, Last study date.*
 - Exam lists can be sorted by: *Date, Identifier, Description, Performing physician, Referring physician.*
 - Series lists can be sorted by: *Number, Type, Identifier, Name, Last study date.*
 - Image lists can be sorted by: *Number, Old-to-new date, New-to-old date.*

6-5 Deleting images

To delete patients, examinations, series, or images from the image disk of the workstation, use one of the *Delete* buttons:

- EITHER: Select the items you want to delete in the corresponding list, then click on the **Delete** button under that list (if the button is not displayed, it can be turned on using the Tools menu).
- OR: Drag the selected item using the middle mouse button, and drop it on the large *Delete* icon at the bottom right hand corner of the screen.



A message window pops up asking you to confirm the delete operation. Click on **OK** to confirm, or click on Cancel to cancel the operation.

If a delete button is displayed in grey, this indicates that the selected item is currently in use by an application (Viewer or Network transfer), and therefore cannot be deleted.

- If the mass storage option is present, an *Auto Delete* function can be set. This automatically deletes items from the local database when they have been committed by the storage device. The function must be activated by GE Service.

6-6 Interchange media

If the Interchange Media option is installed on the system, you can use the *Push* button below the patient list, exam list, or Image list on the Browser to save selected information on CD-R (CD-Recordable) disks.

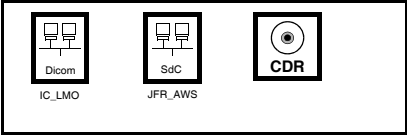
See Chapter [14 Interchange Media](#).



7 Network transfer

7-1 Network options

The Senographe DS system can be provided with a networking option, allowing you to transmit acquired images to other DICOM-compatible review stations. When the system is connected to other workstations or storage devices, they are represented by icons in the Network panel.



The Senographe DS can also be connected to a mass archiving system. The acquired images can then be sent to the archiving device for permanent storage. A list of patients imaged on the Senographe DS system will be maintained on the mass archiving device, ensuring quick and easy data retrieval.

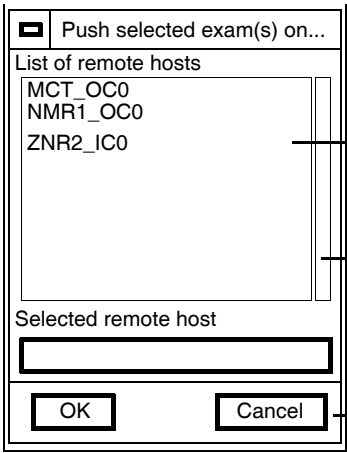
Transfers are made manually or by using the Auto Push function (selected in Medical Application preferences).

7-2 Transfer

To copy patients, studies, series, or images to another workstation or storage device ("remote host"):

- Select the items you want to copy to the remote host in the *Patient name, Study ID, series, or images* list.
- EITHER: Drag the selected group, using the *middle* mouse button, and drop it over the icon representing the remote host in the Network Panel,

OR: Use the Push function; click on the **Network Push** button under the list (if the button is not displayed, it can be turned on using *Browser preferences*; see section [8-2 Browser preferences on page 73](#)). The *Network Push* window is displayed, listing remote hosts:



Click on the name of a remote host to select (highlight) it.

If necessary, use the scroll bar to move through available remote hosts.

OK: initiate transfer
Cancel: cancel the operation

Notes:

- During a transfer, the Network icon shows a transfer animation.
- It is possible to start or review an exam on the workstation while a transfer is in progress.
- Studies which are being reviewed, saved, or transferred are flagged as "In use". When an item is in use, it is protected and cannot be deleted.
- When the transfer is finished, the network icon animation stops; the images are now available on the selected distant workstation (remote host).

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- If the remote host cannot be reached, a pop-up message reports this fact; you should verify that the remote host is operational and check the network cabling. Call your network manager if the problem persists.
- If the Auto Push option is selected in Medical Application preferences, then all images in this exam will be automatically sent to the selected destination after exam closure.
- To archive exams on the mass archiver, the archiver must be selected in the same way as a remote host (select its icon as the drag-and-drop target, or its address as the push destination).

During a network transfer:

- To monitor network transfer tasks, click on the Network status display to open the Network queues window, shown below:

The screenshot shows the 'Network queues' window. It has two main sections: 'Push images' and 'Pull images'. Each section contains a list of jobs with their status: '653/1 Active', '2899 Pending', and '273/3'. Below each list are buttons for 'Pause', 'Resume', and 'Clear'. At the bottom of the window are 'Refresh' and 'Done' buttons. Annotations explain the functions of these buttons and the status indicators.

Resume: restart a paused queue

Pause: temporarily halt the queue

Refresh: update the queue window (the queue window is NOT updated automatically each time a job is finished).

Job currently in progress (points to the 'Active' status in the Push images list)

Click on a job to select it (hold <Ctrl> to select more than one) then click on **Clear to remove job(s) from the queue**

Done: close queue window

8 Tools menu utilities

To access the various system utilities in the *Tools menu*:

- Click on the **Tools menu** button  (near the top right of the Browser screen) to display the utilities menu, then select the desired item from the drop-down menu:

Filter management

Browser preferences

Messages

Network management

Worklist management

Printer Management

Review Room Management

PPS Management

Needle Setup

Medical Application preferences

Edit Patient

Set patient anonymous

Service desktop

Restart Browser

Shutdown

Note:

Only use the items shown here in **bold** type.

Do not attempt to use the other items (shown here in *italics*). They are intended for use only by your Field Service Engineer and are not described here; uninformed use may lead to unpredictable results.

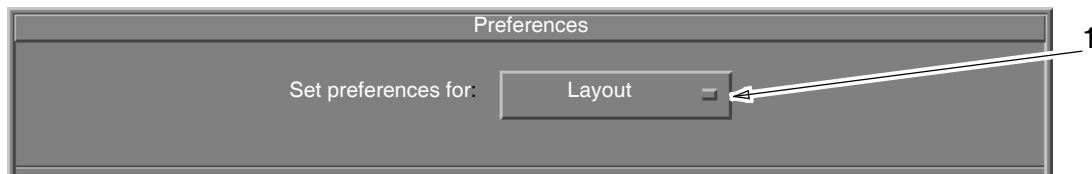
8-1 Filter management

Click on **Filter management** in the Tools menu to *Update*, *Add*, or *Remove* registered filters. See section [9 Filters on page 82](#).

8-2 Browser preferences

Click on **Browser preferences** in the Tools menu to display the *Preferences* window, which allows preferences to be set for *Layout*, *Filter*, and *Sort*.

- Click on the selection box (1) to display windows for each of these choices in turn. Each window displays options which are selected by clicking to "depress" the associated buttons.



- After making selections in each window, use the five buttons at the bottom of the window to apply or save the changes:
 - Save.** Apply the changes to the current display and save them. They will continue to be applied until changed.
 - Apply.** Apply the changes to the current display but do not save them. They will be lost when you leave the Browser.
 - Reload last saved.** After making and applying changes, use this button to apply the last saved preferences.
 - Reset.** Apply default settings.
 - Cancel.** Cancel your changes and close the window.
- Layout.** This window allows selection of icons and windows to be displayed in the Browser window, as shown below:

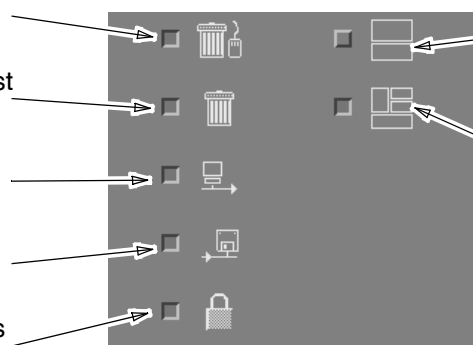
Allow Deletion by Drag and Drop

Display Delete icon below each list

Display Network Transfer icon below each list

Display Interchange Media icon below each list

Display Lock icon below the series list, to allow image protection. A flag in the list shows protection status as U (unlocked) or L (locked).

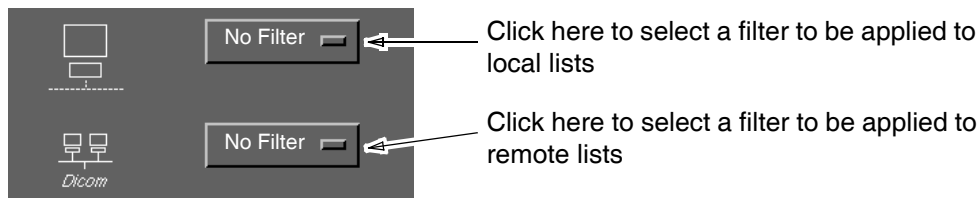


Display only Patients and examinations lists

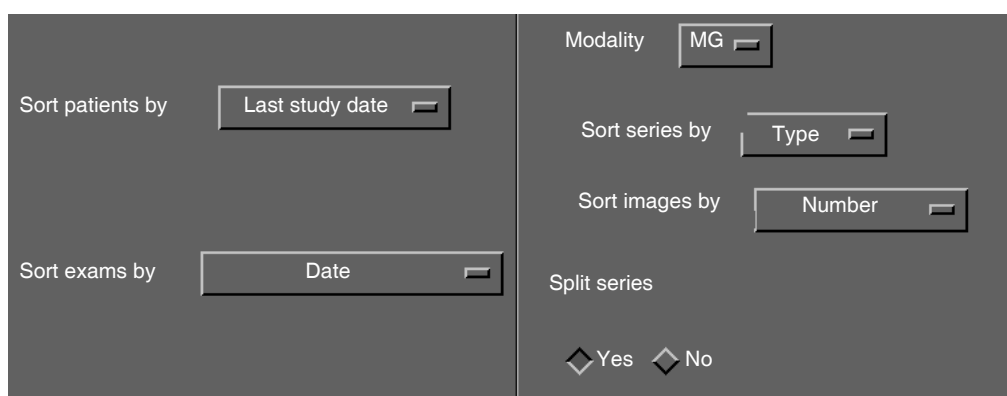
Display Patient name, examinations, series, and images lists

Browser

- **Filter.** This window allows you to specify whether filters (selected from a list of registered filters) should be applied to lists of items held locally (in the AWS) and/or items held remotely (e.g., in a networked remote host).



- **Sort.** Use this window to specify a preferred order for displaying lists of patients and examinations, series and images:

**Note:**

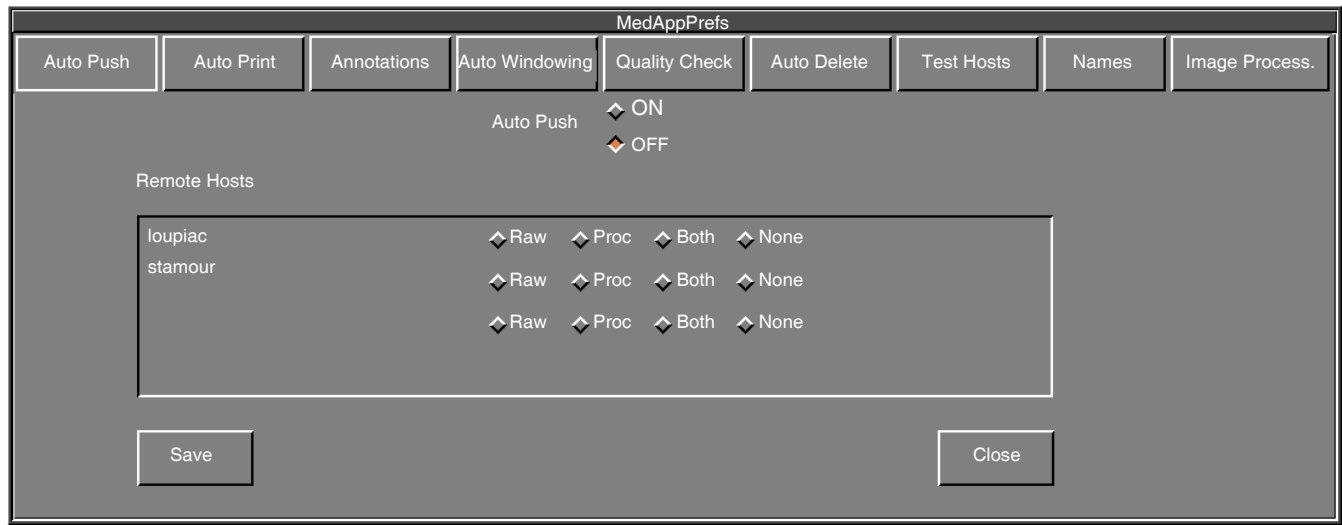
1. You must select *MG* for *Modality* (the system currently defaults to show DX).
2. Leave the selection of *Split series* as *Yes*. Other selections are not valid for this system.

8-3 Medical Application preferences

Select this option to open one of the windows shown and described below to set Medical Application preferences. To change a setting, click the button beside the option to switch it between selected (■ or ▾) and deselected (□ or ▴). After making changes, click **Save** to apply them or **Close** to leave the window without saving.

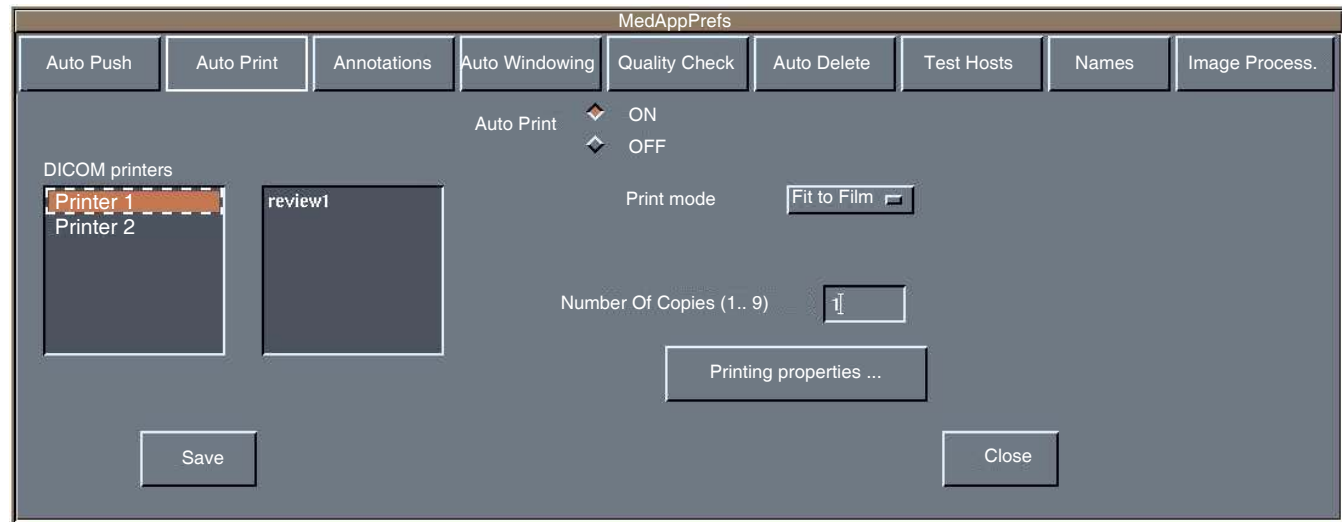
Auto Push

Select Auto Push **ON** or **OFF**, the type of images to be transferred, and the name of the desired remote host. Remote host information is set up by the FE at installation time.



Auto Print

Select Auto Print **ON** or **OFF**, and the name of the desired DICOM printer. Information on available printers is entered by the FE at installation time. Click the *Printing properties ...* button to set printing properties if required (refer to Chapter 13 *Printing*). Only the default print mode of *Fit to Film* is available.



Note:

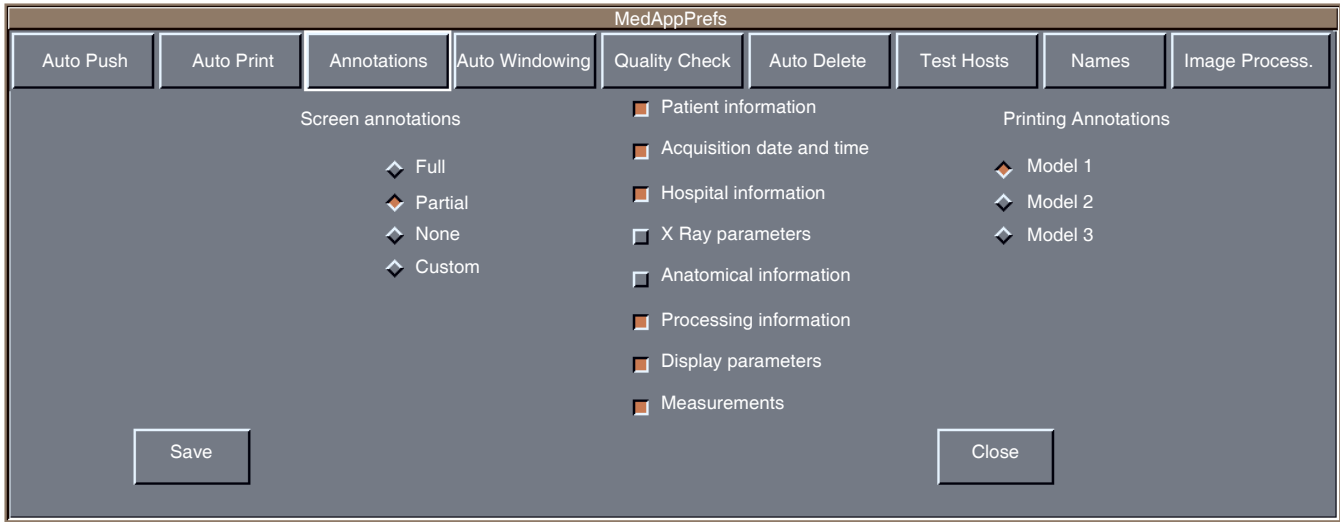
Film size used for autoprint is 8 x 10 inch

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Annotations

Select the level of screen and print annotation desired. Screen annotations are chosen from *Full*, *Partial*, *None*, or *Custom*; the list of annotation types at the middle of the window shows the current default selections for the selected level. For print annotations, select the model (1, 2, or 3) to be used by default (refer to Chapter 13 *Printing*).

Note:
Only annotation Model 3 contains all the information required by MQSA Quality Mammography Standards.



Auto Windowing

Images are stored with four windowing levels, *Standard*, *High*, *Low*, and *User*. Select which level is to be used as the default when an image is displayed. When *User* is selected, the system automatically optimizes the contrast (Window Width) of the image and uses this value as the default *User* value if it is less than the *Standard* value. However, if Premium View is enabled (see *Image Process.* below), selecting *User* value is considered as if *Standard* value was chosen. The *User* level can be overwritten if the user saves the image with modified levels.



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Quality Check

Aim of the Quality Check feature

The Quality Check feature requires the user to apply a qualification level to each image. This qualification level is:

- Used to trigger Auto Push and/or Auto Print
- Used to generate image quality statistics over a given period of time (Repeat and Reject Analysis or RRA)

How to configure Quality Check

Case 2: RRA disabled

Case 1: RRA enabled

MedAppPrefs

Auto Push Auto Print Annotations Auto Windowing **Quality Check** Auto Delete Test Hosts Names Image Process.

Default image quality check

☒ OK
☐ NOT OK

Enable Repeat and Reject Analysis

☒ Yes
☐ No

Auto Push Repeated images? ☐ Yes ☐ No
 Auto Push Rejected images? ☐ Yes ☐ No
 Auto Print Repeated images? ☐ Yes ☐ No
 Auto Print Rejected images? ☐ Yes ☐ No

Save Close

Initial decision: Do you need the RRA feature?

The RRA feature provides an alternative (and automated) method to the manual Repeat Analysis method described in the Senographe DS QC Manual.

It is mainly intended for sites that follow MQSA regulations. For such sites, it is mandatory to perform a repeat analysis at least quarterly.

It is also useful for other sites to generate and keep statistics on total repeat and reject rates, as well as their respective reasons.

Case 1: RRA enabled

If you need the RRA feature, click Yes in the Enable Repeat and Reject Analysis module, then select the cases for which you wish to make use of the Auto Print and Auto Push features.

Note:

Once RRA is enabled, the Default image quality check is set to OK and cannot be modified.

Case 2: RRA disabled

If you do not need the RRA feature, click No in the Enable Repeat and Reject Analysis module, then select the *Default image quality check OK or NOT OK*.

This "qualification level" will be the default qualification level applied to all subsequently acquired images.

Next, choose the desired behavior of Auto Print and Auto Push (refer to [Auto Push](#) and [Auto Print](#) above).

Note:

When RRA is disabled, the Auto Push and Auto Print settings in the Quality Check window are grayed out and cannot be configured.

Auto Delete

Select the appropriate Auto Delete radio button, corresponding to whether or not you want the Auto Delete function to be enabled. If you enabled the Auto Delete function, then specify the profile of images to be automatically deleted. Raw and/or processed images can be automatically removed from the AWS internal disk system when they have been transferred (sent) to another Workstation, or committed by a mass archiver.

The screenshot shows the 'MedAppPrefs' window with the 'Auto Delete' tab selected. The 'Auto Delete' radio button is checked. Below it, the 'Auto Delete Profile' section contains six options, each with a diamond-shaped selection button:

- Raw Images Sent
- Both Images Sent
- Processed Images Committed
- Processed Images Sent
- Raw Images Committed
- Both Images Committed

At the bottom of the window are 'Save' and 'Close' buttons.

Note:

When the function is turned on, at least one of the profile buttons must be selected; if the disk system's used capacity reaches the Upper Threshold value*, the oldest exams are deleted by the system to make space for new ones, until the disk space reaches the Lower Threshold value*. Images which have been on the disk for less than the Minimum Storage time* are not deleted.

* Values for Upper Threshold, Lower Threshold and Minimum Storage time have been adjusted by your Field Engineer at system installation, according to the workflow information you provided to him. Call your Field Engineer in case you want to modify those settings.

Test Hosts

Use this screen to test remote host connections. Select the host(s) to be tested in the three windows (*Remote Workstations*, *Remote Printers*, and *Remote HIS/RIS servers*), and click the **Test selected hosts ...** button to start the test. A message is displayed to indicate whether the test was successful or the host could not be reached.

MedAppPrefs

Auto Push Auto Print Annotations Auto Windowing Quality Check Auto Delete Test Hosts Names Image Process.

Select remote hosts you want to test

Remote Workstations
ImageServer
stolvezen
testmamo071

Remote Printers
FFDMDUMMY
kodak 8610

Remote HIS/RIS servers
stamour

Test selected hosts ...

Save Close

Names

Use this screen to enter and store the names of *Operators*, *Performing physicians*, and *Referring physicians*. The stored names may then be recalled from the database when required, avoiding the need for retyping each time a Medical Procedure Card is created or updated.

MedAppPrefs

Auto Push Auto Print Annotations Auto Windowing Quality Check Auto Delete Test Hosts Names Image Process.

Define or modify names in database

Operators
Operator 1
Operator 2

Performing physicians
Performing Physician 1

Referring physicians
Referring Physician 1
Referring Physician 2

add
modify
delete

Save Close

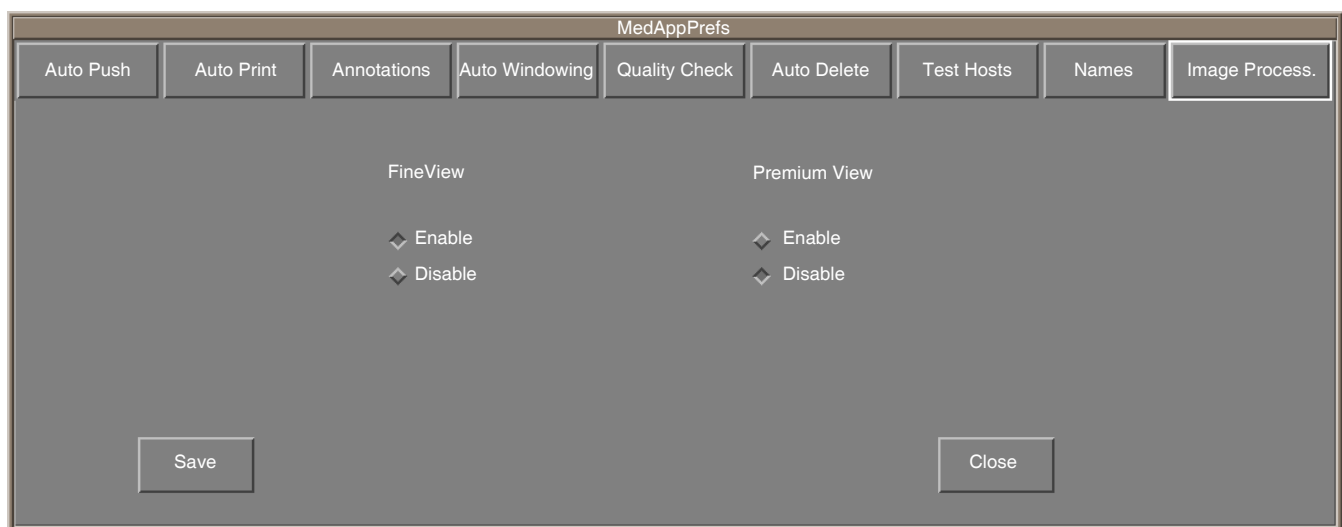
Image Process.

Use this screen to enable or disable FineView and/or Premium View.

If FineView is enabled, it will be applied on all RAW images generated by the Medical Application. Refer to Chapter 12 *Image Acquisition Procedure*, section 9 *Image acquisition on page 133* for more information on using FineView.

If Premium View is **enabled**, it will be applied to all eligible processed images generated by the Medical Application. Refer to Chapter 12 *Image Acquisition Procedure*, section 12 *Processing on page 135* for more information on using Premium View.

If Premium View is **disabled**, Thickness Equalization will be applied to all eligible processed images generated by the Medical Application. Refer to Chapter 12 *Image Acquisition Procedure*, section 12 *Processing on page 135* for more information on Thickness Equalization.



8-4 Edit Patient

This option is normally turned off, but may be turned on by a GE Service Engineer if required. It allows information on the patient *Medical Procedure Card* (described in Chapter 9 *Worklist*) to be viewed and modified after the exam has been closed. Changes are made by creating a new patient or a new examination; the original file is always kept for security reasons.

Any changes made to the *Patient* identity information cause a new patient file to be created, with copies of the existing exams. Fields which can be changed are: name, ID, date of birth, and sex. No change can be made to fields such as *Operator*, *Referring Physician*, or *Performing Physician*. When changes are made and a save is requested, a confirmation message is displayed. If the save is confirmed, a message is displayed as a warning that a new entry will be made in the database, and suggests that the old information should be manually removed. Note that if the old records are not deleted, repeated use of this facility can rapidly use up disk space.

8-5 Set patient anonymous

This option allows an anonymous set of images to be created, for discussion with colleagues, etc. Select one or more patients in the *Patient name* list, then click on the **Set patient anonymous** option in the *Tools* menu. The patient examinations are copied and used to create a new patient with the name NO NAME and a unique randomly created ID.

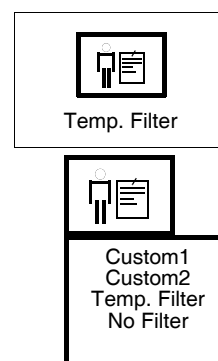
9 Filters

Filters allows the lists of patients and exams shown in the Browser to be "filtered"; in other words, to display only items which correspond to your chosen criteria (for example, between chosen dates, with certain Patient name or IDs, etc.).

Filters can be temporary, in which case they will be lost after the current session, or can be "registered" as a named filter which can then be recalled for later use.

9-1 To select a registered filter or create a temporary filter:

The legend under the button in the Filter Panel at the top of the Browser shows the current selection for the Browser Filter.



To change the current selection, click the **Filter** button in the Filter Panel and make your selection from the drop-down menu:

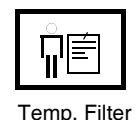
- Custom...* Use registered filters that have been defined and saved beforehand (Custom1 and Custom2 in this example),
- Temp. Filter* Use a temporary filter,
- No Filter* Display all available Patients, Examinations, Series, and Images.

9-2 Temporary filter

For occasional queries, use a temporary filter. The filter is used only for the current Browser session and is not saved.

Click on the **Filter** button and select **Temp. Filter** in the drop-down menu.

The Local temporary filter window is displayed in which you can specify the filter characteristics:



- Filters can be specified at Patient level, Exam level, and Series level. By default, Patient level is selected first, but you can select these levels in any order; click the appropriate box to start specifying filter criteria.
 - Patient level: you can choose to begin the listing with a specified Patient name or Patient ID.
 - Exam level: you can choose to begin the listing with a specified Exam description, Performing physician or Referring physician name, or to list only exams made between certain dates and/or times. Do not change the default selection of mammography exams (MG), since the AWS cannot display images from other modalities.
 - Series level: you can choose to list only exams with a specified text in the Series description, and to list only SCPT (secondary capture), Raw, or Processed exams.
- When you have made your selections in each level, click one or more of the boxes at the bottom of the screen (Patient, Exam or Series) to specify at which level the filter is to apply. Each choice made at patient, exam, or series level allows you to select how the specified text is to be used to select listed items:
 - "Begins with". Items are displayed if they begin with the specified letter or word(s).
 - "Contains". Items are displayed if their description contains the specified text.
 - "Is". Items are displayed only if their description exactly matches the specified text.

- At any time you can click **Clear** to delete the choices made and start again, or **Cancel** to return to the previous screen.
- When your selections are correct, click **Apply**.
The filter is applied, but is lost when the current session ends.

9-3 Registered filters; Filter management

For repeated queries, use custom filters. A custom filter is defined and saved (registered) separately. Once defined and saved, the name of the custom filter is added to the Filter menu. It can then be used at any time, using the *Filter* button and drop-down menu.

- To create, update or remove a custom filter, select **Filter management** in the Tools menu:



The *Filter selection* window is displayed, giving a list of registered filters and a list of options:

<i>Update</i>	Modify a registered filter (selected from the list)
<i>Add</i>	Create a new registered filter
<i>Remove</i>	Remove a registered filter
<i>Done</i>	Return to the previous screen

- The default choice is **Add**. If you select **Add** or **Update**, the *Local filter* window is displayed, in which you can specify the new or modified filter characteristics.
This window is identical to that used for a temporary filter, except that you must specify a name to identify the filter. On completion, you are asked to *Save* the new or modified filter.
- To apply the filter, return to the Browser and select the filter using the *Filter* icon.

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Chapter 9 Worklist

1 Worklist function

The Worklist is a list of scheduled tasks. Typically, it shows all patients scheduled for examination during a working day.

When the Senographe DS system is connected to a Dicom Worklist Management SCP (Service Class Provider) system, entering the Worklist function displays a Worklist downloaded from the SCP system, using the Dicom Basic Worklist Management Service. Downloading information in this way reduces the workload on the AWS, increasing throughput and decreasing the risk of errors. However, Worklist entries can also be made locally, from the AWS.

Click on the Worklist icon at the right of the Browser window to display the *Worklist* window as shown below. To start an exam, select the required patient in the list. Selections can be made by clicking with the left mouse button, or by entering appropriate text in one of the three *Selection Criteria* text boxes above the list; *Patient ID*, *Patient Last Name*, or *Accession Number*.

When the correct patient has been selected, click the *Start Exam* button or double-click on your selection to continue with Image Acquisition. See below for more information.



Worklist as of 16:16 January 07 2000

Selection Criteria

Patient ID Patient Last Name Accession Number

Status	Input	Start Date&Time	Patient Name	Patient ID	Procedure Description	Accession #	Study ID
		Jan 07 200 15:15	jones aretha	2	left breast	2	
		Jan 07 200 15:10	smith anna	3	right breast	1	

Refresh Worklist Query... Edit... Browser

New Patient... Delete Delete All Type of Exam: Routine Start Exam

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Worklist

- The *Worklist* title bar shows the date and time of the last update (manual or from HIS/RIS).
- Click the **Browser** button to return to the Browser window.
- By default, when the window opens, the Worklist is sorted by *Patient Name*, the first item in the list in which the number of images is zero is selected, the cursor is in the first selection criteria entry field, and the default push-button is *Start Exam*.
- The Worklist information is displayed in columns. You can sort the entries according to the information in any column, in ascending or descending order, by clicking the title at the head of the column. For example, to sort on patient name, click the **Patient Name** button. The entries are automatically displayed in ascending order of name, and a + sign appears in front of the title (*+Patient Name*). Click the button again; a - sign appears in front of the title (*-Patient Name*), and the entries are now displayed in descending order of name.
- Items in the Worklist are selected/deselected in the usual way by pointing and clicking. Non-consecutive multiple items are selected by holding down the **<Ctrl>** key while clicking. To select a range of consecutive multiple items, select an item, then hold down the **<Shift>** key while clicking another; both items and all in between are selected.
- To find and select an item in the list, use the *Selection Criteria* at the top of the window. As soon as a character entry is made in one of the boxes (*Patient ID*, *Patient Last Name*, *Accession Number*), the window scrolls to show and select the first matching entry. When an entry is made in one of the criteria boxes, the other two are automatically cleared.
- Click on the **Refresh Worklist** button to download the current Worklist from the configured Dicom Worklist Provider. If the Dicom Worklist feature is not installed, or the Provider is not configured, this button is greyed out and not active.
While the list is being updated, an indicator *WORKLIST LOAD IN PROGRESS...* is displayed, the *Refresh Worklist* button becomes *Cancel Load*, and all buttons except *Cancel Load* and *Browser* are disabled.
- Click **Query...** to display the *Query definition* window, to define the networked Worklist parameters.
- To delete selected patients, click the **Delete** button. To delete all patients, click the **Delete All** button. User confirmation is requested before deletion.
- Click **New Patient...** to display an empty Medical Procedure Card window, allowing a new patient to be added to the list.
- Click the **Edit...** button (only active if a single item is selected) to display the Medical Procedure Card window with data for the selected item, allowing you to view and/or add information.
- If the Stereotaxy option is present, select *Routine* or *Stereo* in the *Type of Exam* window.
- With the correct patient selected in the Worklist, click **Start Exam** or double-click your selection to display the *Viewer* window and allow image acquisition for the scheduled patient.

2 Image acquisition

2-1 Medical Procedure Card

The Medical Procedure Card (MPC) is used to enter all patient-, procedure- and operator-related data. This data is saved together with the exam images.

Note:

Patient Last Name and Patient ID are mandatory: you cannot start an exam if these fields are not completed. The remaining information on the card is optional.

There are three ways to enter the data:

- Manually.
Enter the information directly into each of the MPC fields.
- Through a DICOM HIS/RIS system.
In this case the Worklist receives directly from the Hospital or Radiology Information System the patient and/or procedure information needed to fill in the MPC.
Patient information and some procedure information (accession number and Study ID) received in this way cannot be modified.
- Using a Barcode Scanner (optional on Senographe DS).
If your facility produces barcode labels to identify patients and their scheduled exams, all the data stored on the barcodes can be scanned with the Barcode scanner option. Scanning produces an MPC for each patient scanned, saving time and reducing errors as compared with an exclusively manual data entry process.

Worklist

When you select a single patient in the Worklist and click **Edit...**, or when you click **New Patient...** or **Start Exam**, the Medical Procedure Card window is displayed.

- For a new patient, all fields are blank; move the cursor (use the mouse, or use the Tab or Enter keys to move through the fields) inside the *Last Name*, *Middle Initial* (optional) and *First Name* fields and enter the patient name. Then move the cursor inside the *Patient ID* field and enter the patient ID. If the patient has an implant (in whatever breast), tick "Yes" after "Implant present" label. In case the review station used at your facility can read this field, it will automatically load an adequate protocol and/or adapt the autowindowing for review of images of this patient.
- For a new study (existing patient) the patient information fields cannot be modified. Complete the other fields as required, then click on the **Start Exam** button. The Medical Procedure Card window closes, and the Viewer is displayed.
- For a patient selected on the HIS/RIS Worklist, verify that the information in all fields of the Medical Procedure Card is correct and click **Start Exam** to begin the exam, or Cancel.

- After the first acquisition has been made, the information in the Medical Procedure Card cannot be changed. However, errors can be corrected by creating duplicate information using the Edit Patient option in the Tools menu (described in Chapter 8 *Browser*). The original information is saved for security.

2-2 Image Acquisition - New Patient...

To start an exam for a new patient:

- Click on the **New Patient...** button.
The Medical Procedure Card window is displayed.

Note:

A patient must have unique identifiers (name and ID mandatory, first name optional).

- When the card entries are complete, click on **Save** to add the patient to the Worklist for future use, **Start Exam** to begin the exam, or **Cancel** to exit.

If **Start Exam** is selected, the Viewer opens with the Medical Procedure Card displayed.

Check the information displayed. If it is not correct, do not proceed; select **Cancel** and confirm to close the Viewer. On returning to the Worklist, select the correct patient and select **Edit....** Make any changes required, then click **Start Exam** to again open the Viewer with the Medical Procedure Card displayed. If the information is now correct, begin the first acquisition.

2-2-1 Patient Birth Date

To enter the Birth Date in the *Medical Procedure Card*, type the month (first three letters), space, the day (two digits), space, and the year (four digits), i.e.: MMM DD YYYY. The first three letters of the month must be typed in English, regardless of the language of the system. The following table gives the English abbreviations of month names:

Month	English Abbreviation
January	Jan
February	Feb
March	Mar
April	Apr
May	May
June	Jun
July	Jul
August	Aug
September	Sep
October	Oct
November	Nov
December	Dec

2-3 Edit Patient

To edit patient information (only possible before making the first acquisition for the patient):

- Select the patient in the list and click on the **Edit...** button.
The Medical Procedure Card window is displayed.
This function is not available for information received from an HIS/RIS Worklist.
- When the changes to card entries are complete, click **Save** or **Start Exam**.

2-4 Image Acquisition - New Examination

To add an exam for an existing patient:

- Select the patient name in the Patient list on the Worklist by clicking on it.
- Click on **Start Exam**.

The remaining procedure is the same as for a new patient, except that the patient and procedure information fields (other than operator and physician) in the Medical Procedure Card are already complete and cannot be modified (displayed in grey).

2-5 Image Review

To review images stored on the workstation image disk, return to the Browser screen:

- In the Browser screen, select the desired images. Select first the patient, and then the exam (study) by clicking on them.
To select only a specific image for display, click on it in the list. To add more images, click on them in the list while holding down the **<Ctrl>** key on the keyboard.
- Click the **Review exam** button.

The same functions that are available after image acquisition (image adjustment, measurements, annotations, etc.) are also available in review mode, with the exception of the 2D Localization function.

3 Bar Code scanner (option)

The Senographe DS bar code scanner is a fast and accurate optional tool for scanning bar code symbols in AWS applications. It is normally mounted on the side of the AWS Cabinet.

The scanner captures entire bar code symbols instantly. The integrated decoder then transmits the data to the AWS just as if data were entered from the AWS keyboard.

Supported bar code symbol systems are:

- Code 3 of 9 (standard & full-ASCII).
- EAN 13.
- Code 128.



Scanner trigger

3-1 How to read a bar code symbol

The Senographe DS bar code scanner is simple to use - just aim and shoot. Before using it, make sure all cable connections are secure.

1. Lift the scanner from its support; Hold it naturally in one hand, with your finger on the scanner trigger. Hold the scanner handle horizontally, with the beam window directly over the sample bar code symbol (code 128) shown here:



0123456789

2. Press the scanner trigger: the scanner red LED beam lights. The scanner has successfully read the symbol if:
 - You hear a beep.
 - The LED beam turns off.

3-2 Set default configuration

The scanner should already be configured for use with the AWS. If not, configure the scanner to the default configuration is easy. You simply scan bar code menus.

- Follow the steps below to reset the scanner to the AWS configuration. At each step, read the bar code provided, using the scanner as described above (section Chapter 3-1 [How to read a bar code symbol](#)). You should hear one or more beeps after each scan:
- Reset the scanner to the factory settings.



- Set the default language.



- Set the default language to English. The scanner must always be set to English for use with the AWS



- Save the new settings.



- Refer to the scanner documentation for more information on using the scanner.

3-3 Using the scanner for AWS text entry

To enter text in AWS data entry fields using the bar code scanner:

- Set the cursor in the desired data entry field in the usual way, as if you were about to use the keyboard for text entry.
- Scan the appropriate bar code symbol as described in section Chapter 3-1 [How to read a bar code symbol](#). The decoded text appears in the text field just as if you typed it using the keyboard.

3-4 What If...?

- Nothing happens when you follow the operating instructions:
 - Check the system power.
 - Check for loose cable connections.
- The AWS goes back to monitor *OK* prompt:
 - Resetting or disconnecting/reconnecting the bar code scanner may cause the workstation to return to the monitor *OK* prompt. In this case:
Type the command go **<Enter>** to return to the normal working mode.
- The scanner does not read a bar code symbol:
 - Be sure the scanning system is programmed to read the type of bar code you are trying to scan. Refer to section [3-2 Set default configuration on page 92](#).
 - Be sure the bar code symbol is not defaced.
 - Be sure that you are holding the scanner correctly to scan the symbol, as illustrated below. The scan head must touch and cover every bar and space on the symbol. You can tilt the scanner forward or backward. Practice will quickly show you how to hold the scanner.



0123456789

Right



0123456789

Wrong

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Chapter 10 Modality Performed Procedure Step (PPS)

1 Overview

The Modality Performed Procedure Step (PPS) function is an automated function that allows the Senographe DS acquisition system to automatically inform a remote network host (typically located on the Radiology Information System (RIS) or the Picture Archiving and Communications System (PACS)) of the Radiology department about the completion status of the locally performed examinations. Typically, it enables the Senographe DS to automatically inform the other connected devices such as the PACS, the RIS and the Computer Aided Detection (CAD) system (if available) whether a given scheduled or unscheduled exam is in progress, completed or on hold.

The activation of this function within a Radiology Department is subject to the following pre-requisites:

- An image archiving system (PACS) must be accessible for Auto Push of the acquired images via the DICOM protocol,
- A DICOM Performed Procedure Step Service Class Provider (PPS SCP) must be connected to the Senographe DS. In general, such a DICOM service is available from either the RIS or the PACS.
- It is strongly recommended that the Senographe DS also be connected to a DICOM worklist management SCP for automated worklist retrieval. For additional information on the worklist function on the Senographe DS, please refer to Chapter 9 [Worklist](#).

2 Theory of Operation

Once activated, the PPS function essentially performs background tasks to exchange information with the configured PPS SCP. This function is activated for both routine and stereotactic (if the option is present) examinations.

When the Viewer is started and after the first image has been acquired, an initial PPS message is sent from the AWS to the PPS SCP to inform it that the examination is now in progress. This message also contains the patient and clinical data stored in the worklist entry used to launch the Viewer. These data can either have been downloaded from a worklist server or entered manually on the AWS itself.

When the Viewer is closed, a second PPS message is sent to the PPS SCP to update the examination data with the following information:

- A user-selected exit status (see Section [5 PPS in the Viewer on page 97](#)).
- A list of the images that will be automatically sent, via the Auto Push feature, to the associated Image Archiver or CAD.

Note:

In order for the PPS messages to be sent, the Auto Push feature from AWS to the associated Image Archiver or CAD must be activated.

Note:

In case some images have been excluded from the Auto Push list (e.g. using the Quality Check feature) those images will not be listed in the PPS messages sent to the PPS SCP.

- The cumulative AGD (Average Glandular Dose) calculated based on the AGD estimation available for images acquired in AOP. This dose per examination estimation is computed using the following rules:
 - Images that have been acquired and excluded from the Auto Push list (e.g. using the Quality Check feature) are accounted for in the overall dose value.
 - Images acquired in Manual Mode are not accounted for, as no dose estimation is available for them.

3 Special Configuration for CAD Workflows

If a mammography CAD system is available, the PPS function can be configured to send specific PPS messages to the PPS SCP of the CAD system itself. This configuration might be needed to suit specific needs related to the CAD system or to suit the case where different image lists are sent to the CAD and the Image Archiver.

4 PPS Configuration

PPS configuration is accessed by clicking the **Tools menu** button and selecting *PPS Management* as explained in section [8 Tools menu utilities on page 72](#) of Chapter [8 Browser](#).



Notice:

The *PPS Management* panel is not intended for use by operators of the Senographe DS, and therefore is not described here. Refer to your Field Service Engineer (or possibly your local network administrator) for assistance on setting up PPS hosts, as uninformed use may lead to unpredictable results.

5 PPS in the Viewer

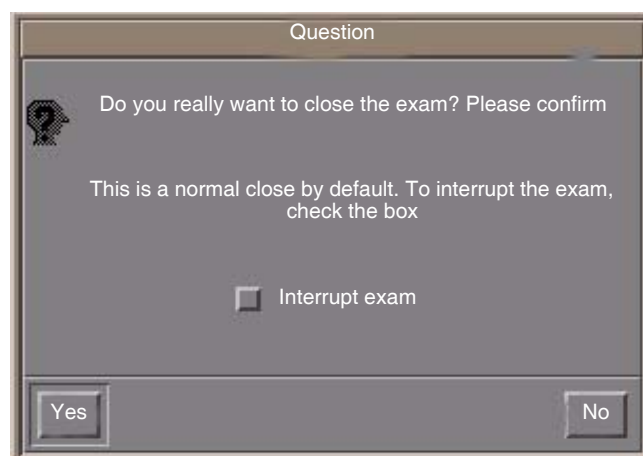
To be able to optimize post acquisition tasks, the Senographe DS sends a completion status to the PPS SCP when the exam is started and when it is closed.

When a routine or stereotactic examination is started, and the first image has been acquired, the Senographe DS automatically sends an IN PROGRESS status to the PPS SCP.

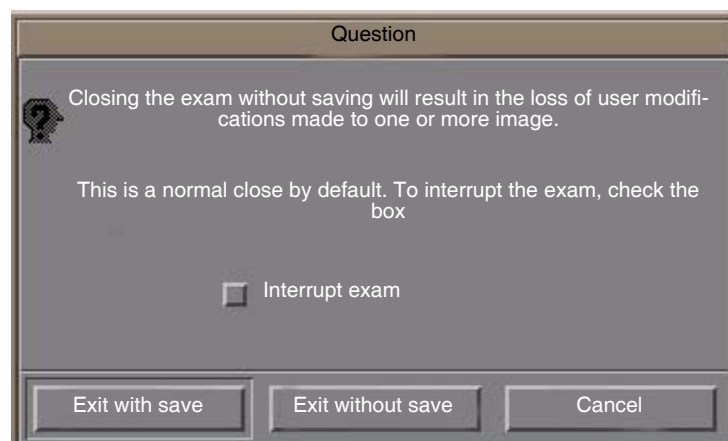
When the user closes this Viewer session, one of two possible completion statuses is sent to the PPS SCP:

- **COMPLETED:** The procedure described in the worklist entry used to perform the acquisitions of this Viewer session has been completed. No further images are to be acquired for this procedure.
- **DISCONTINUED:** The procedure described in the worklist entry used to perform the acquisitions of this Viewer session is not completed. Most likely further images will be acquired for this procedure to be completed.

By default, all closed examinations are defaulted to sending the **COMPLETED** status to the remote PPS SCP. In order to switch the status to **DISCONTINUED**, select the **Interrupt exam** checkbox that appears in the Question popup of the Viewer:



OR



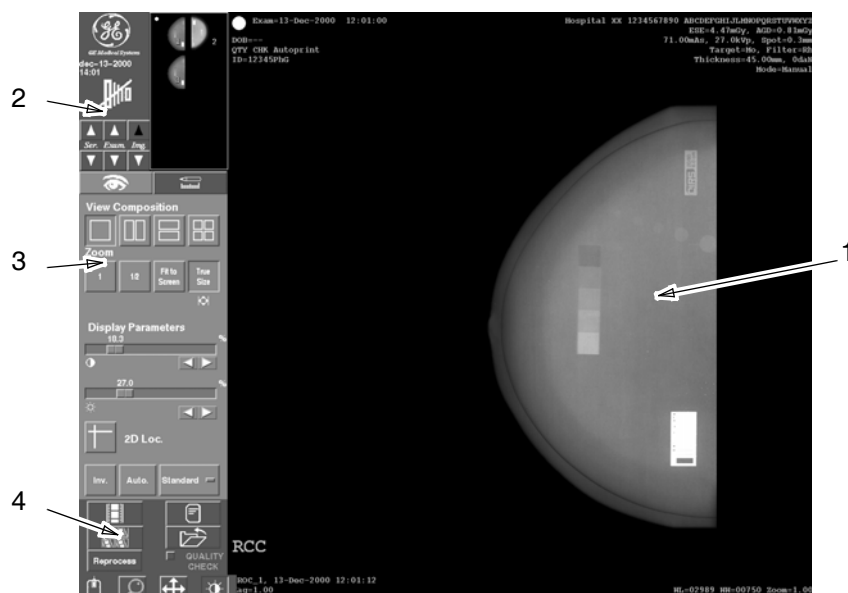
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Chapter 11 Viewer

1 Overview

- The Viewer window is displayed:
 - When the **Review exam** button in the Browser window is clicked after selection of a Patient, examinations, or series. The Viewer window opens and displays the first acquired image.
 - When the **Start Exam** button in the Worklist window is clicked after selection of a Patient in the Worklist. The Viewer window opens, with the Medical Procedure Card displayed, ready to display the acquired image.

The Viewer is used to display, manipulate, and analyze images that have been acquired using the Digital Detector or recalled from the image disk for review.



- Most of the screen is used for the *Viewing Area* (1), in which images are displayed.
- At the left of the screen, there is a *Command window*, which includes three main sections:
 - The *Mosaic Image Browser* (2).

The *Control Panel* (3).

Two selection buttons at the top of the panel allow one of two different *Control Panels* (*View Control* and *Annotation*) to be displayed, according to the functions required. A third selection is possible if the *Stereotaxy* option is present. Functions available from the two panels are described in sections [2 View Control on page 103](#) and [3 Annotation on page 106](#).

- Function panel (4). Provides access to the Medical Procedure Card, image reprocessing, image printing, Scrapbook, image quality check, Middle mouse button function selection, and exit from the Viewer.

- To leave the Viewer, click the **Close Exam** button  in the Function panel. All changes to annotations are saved. If changes have been made to brightness or contrast settings, you are asked to *Exit with save*, *Exit without save*, or *Cancel*.

Note:

Processed images reproduce film behavior and are not intended for quantitative measurement. To make measurements based on pixel intensity in an acquired image, use the raw image.

1-1 Viewing area

You can choose to have one, two or four images displayed in the viewing area. See section [2 View Control on page 103](#) on how to select the desired layout.

To make it easier to view the images in the viewing area, you can place a "shutter" (mask) over the command window.

- Press the <F10> function key (in the top row on the keyboard) to place the shutter. Press the <F10> key again to bring the command window back into view.

1-1-1 FB view exception

On the AWS, the View and laterality indication is placed in the lower part of the monitor.

Most images of the breast are presented with the axillary region in the upper part of the monitor.

The **FB** (**F**rom **B**elow) views, i.e., radiographic images taken with the X-ray tube directly below the breast (Arm angle between +170° and +185), are presented in deviation to this practice and have the axillary region in the lower part of the monitor.

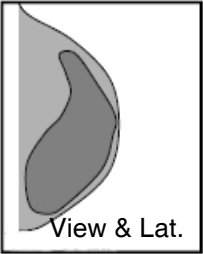
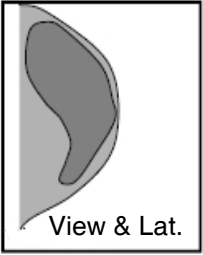
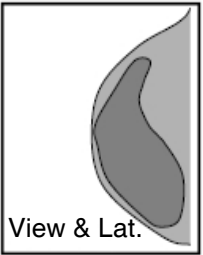
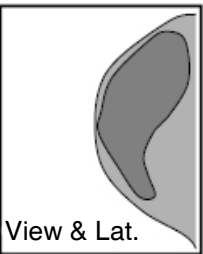
CAUTION

As a consequence, except for the case of FB views, the View and laterality indication is NOT positioned near the axilla.

Note:

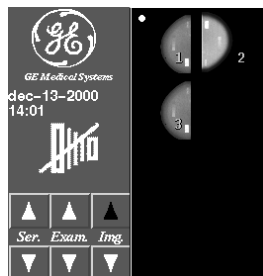
If the Operator has performed rotations or flips to the image on the Viewer, the axilla might be in a different position from that stated above. The Operator can always use the "Display Normal" function to restore the initial image display. In any case, the rotations and flips applied to the images are not stored at exam closure.

The table below clarifies the orientation of images and their respective View and laterality marker positions on the AWS monitor:

General case for Left Views	Axilla View and laterality label incorrectly positioned. 
LFB	Axilla 
General case for Right Views	Axilla View and laterality label incorrectly positioned.
RFB	Axilla

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1-2 Mosaic image browser



The Mosaic Image Browser shows the content of the current exam in the form of thumbnail (reduced size) images. Up to eight such images can be displayed at one time.

If the current exam contains more than eight images, use the *Img.* up/down arrow buttons to scroll through the full set.

To view images from the next or previous Series or Exam, use the corresponding up-down arrow buttons (*Ser.* or *Exam.*).

Click on the desired image in the Mosaic Image Browser to display it in the viewing area.

A white dot on the reduced image in the Mosaic Image Browser identifies the currently displayed image.

A camera icon  appears above the arrow buttons when the Viewer is being used for image acquisition. When the Viewer is used for image review, the icon appears with a bar , and image acquisition is inhibited.

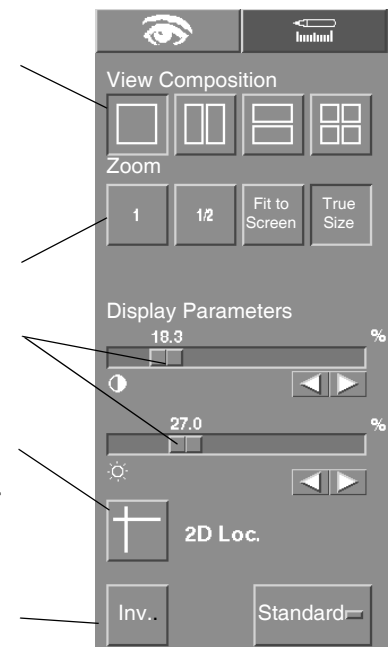
1-3 Image selection

To work on an image in the viewing area, it must be *selected* (active). To select an image, click anywhere on it. The selected image is identified by a large white dot in the upper left corner.

2 View Control

To use the *View Control* Control Panel, click on the View Control "eye" icon  to highlight it.

- *View Composition.* Click on the appropriate icon to display a single image, two images side by side, two images one above the other, or four images. Images are arranged in order (left to right, top to bottom) according to the order in which they were acquired. To display images on the monitor according to the ACR standard, they should therefore be acquired in the order: RCC, LCC, RMLO, LMLO.
- *Zoom.* Click on the appropriate Zoom icon to choose a Zoom factor. See description below.
- *Contrast and Brightness* (window width and window level) sliders. See description below.
- *2D Localization.* Click on this icon to display horizontal and vertical lines on the screen; they can be moved with the mouse to identify a particular position on the image. This facility is available only in acquisition mode (with the camera icon  displayed in the Mosaic area). See description below.
- *Image Control.* Use these controls to choose appropriate display parameters. See description below.



2-1 Zoom

When the image is first displayed in the viewing area, it is displayed with a Zoom factor called "Fit to Screen". The Zoom factor is calculated so that all of the image is displayed in the space available in the viewing area.

- Click on the appropriate Zoom button to select the desired Zoom factor:
Zoom=1 corresponds to a full resolution display: each pixel on the screen corresponds to a pixel on the Digital Detector.
Zoom=1/2 corresponds to a half resolution display: a pixel on the screen corresponds to the average of 4 pixels on the Digital Detector.
Fit to Screen: the image is displayed at a Zoom factor that optimizes the screen layout.
True Size: the image on the screen is displayed with the same size as that of the original breast image projected onto the Digital Detector. This facility is not available when viewing SCPT images.

2-2 2D Localization

In acquisition mode (with the camera icon  displayed in the Mosaic area), the 2D Localization function allows you to display and position a set of cross-hairs on the image.

These are used on images acquired using one of the optional 2D localization paddles (graduated 2D large localization paddle or 2D spot localization paddle) to precisely locate a point of interest on the image, in order to introduce a needle or to position a marker for a tangential view.

- Click the **2D Localization** button to display the cross-hairs on the image.
- Move the mouse pointer onto the intersection of the cross-hairs, then press and hold the left mouse button. The cursor changes to a pencil shape; move the cross-hairs by moving the mouse.



Move the cross-hairs exactly over the point of interest; you can now read their position relative to the graduations of the compression paddle on the image. It may be necessary to first apply a Zoom level of 1 or 1/2 to view the area displayed, then to reduce the zoom level to see the paddle alpha-numerics for cross-hair location.

- Click the **2D Localization** button again to remove the cross-hairs.

Note:

When you close the exam, any 2D Localization cross-hairs on an image will be saved with the image, and will be displayed again when the image is selected for review at a later stage.

On an image that has been saved on the database and is recalled in image review mode, the 2D Localization cross-hairs can no longer be modified or deleted.

2-3 Contrast and Brightness sliders

To use the sliders for precise adjustment of image contrast and brightness, you can:

- Select the slider cursor (small box inside the slider bar) and drag it left or right as required. The value above the slider changes accordingly (higher values indicate less contrast or increased brightness) and the screen displays the change in contrast or brightness.
- Click on the left arrow or right arrow buttons, just below each slider, to change contrast or brightness by small increments.
- Click inside the slider bar, on the left or on the right of the cursor, to change contrast or brightness by large increments.

The adjustment only acts on the currently selected image (primary selection, indicated by the large white dot in the top left corner).

Note:

You can also use the auto windowing selection button (see Image Control, below) or the Multi-Function mouse button (the middle button) for contrast and brightness control (see section [4-7 Middle Mouse button on page 120](#)).

2-4 Image control

Invert

Click the **Inv.** button to invert the image contrast and brightness values, so that any microcalcifications present appear black. Press the button again to return the display to the original default values, so that microcalcifications appear white.

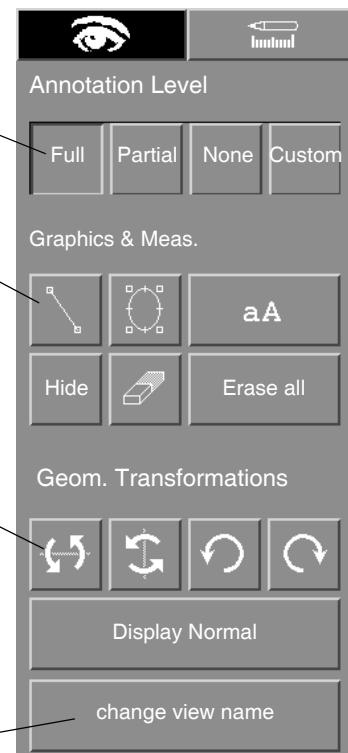
Auto Windowing

- Four windowing values are stored with the image: *Standard*, *High*, *Low*, and *User*. Use the Medical Application Preferences Auto Windowing panel (see Chapter [8 Browser](#)) to select which of these values is to be used by default when first displaying an image in the Viewer. When *User* is selected, the system automatically optimizes the contrast (Window Width) of the image and uses this value as the default user value if it is less than the *Standard* value. When *User* is selected, and the WW value computed is greater than the *Standard* value, the *Standard* setting is used instead. The *User* level can be overwritten if the user saves the image with modified levels.
- The button at the bottom right of the View Control panel shows the name of the windowing value currently applied. To change it, click the button and select the desired setting from the drop-down menu.

3 Annotation

To use the Annotation Level Control Panel, click on the Annotation "pencil" icon  to highlight it.

- *Annotation Level.* Click on the appropriate icon to select the required annotation level. See description below.
- *Graphics & Meas..* Click on the appropriate icon to select and display a measurement tool, to add annotations, or to hide or erase displayed tools and annotations. See description below.
- *Geom. Transformations.* Click on the appropriate icon to flip or rotate the image, or on **Display Normal** to return to the original display. See description below.
- *change view name.* Click on **change view name** to make a correction to laterality and view name, if these were incorrectly selected on X-Ray Console. See description below.



3-1 Annotation Content

Annotations available on the image are:

- Patient information (name, ID, date of birth, age, sex)
- Acquisition date and time
- Hospital information
- X Ray parameters (Entrance Skin Exposure, Average Glandular Dose, mAs, kV, Focal Spot, Track, Filter, Thickness, Compression force, exposure mode)
- Anatomical information (Laterality, View name, magnification factor)
- Processing information (type*, date and time)
- Display parameters (window width, window level, zoom factor, image size, FOV)
- Measurements (annotations associated with measurements)

* Processing type depends on settings made in Medical Application preferences panel (see section [8-3 Medical Application preferences on page 75](#) in Chapter [8 Browser](#)). In case Premium View is not enabled, Thickness Equalization applies, or Auto-contrast for specific cases.

Cases when Thickness Equalization cannot apply are described in section [12 Processing on page 135](#) in Chapter [12 Image Acquisition Procedure](#).

Processing type displayed on the image can be one of the following:

- **PROC_0**, meaning that:
 - FineView processing not applied before the raw image
 - **Auto-Contrast** processing applied on the raw image
- **PROC_1**, meaning that:
 - FineView processing not applied before the raw image
 - **Thickness Equalization** processing applied on the raw image
- **PREMIUM_VIEW**, meaning that:
 - FineView processing not applied before the raw image
 - **Premium View** processing applied on the raw image
- **PROC_0_FV**, meaning that:
 - **FineView** processing applied before the raw image
 - **Auto-Contrast** processing applied on the raw image
- **PROC_1_FV**, meaning that:
 - **FineView** processing applied before the raw image
 - **Thickness Equalization** processing applied on the raw image
- **PREMIUM_VIEW_FV**, meaning that:
 - **FineView** processing applied before the raw image
 - **Premium View** processing applied on the raw image

3-2 Annotation Level

Image size and FOV size are symbolized by [] and #, respectively. For example, when the 13 x 18 FOV is used, the annotation is [] 19 x 23 # 13 x 18.

System annotations are displayed automatically. They show exam-related information such as patient name, patient ID, kV and mAs used, WW and WL, etc. The user can add further annotations (see section [3-3 Graphics and measurements on page 109](#)).

- To select which annotations are displayed, click on the desired button on the control panel:



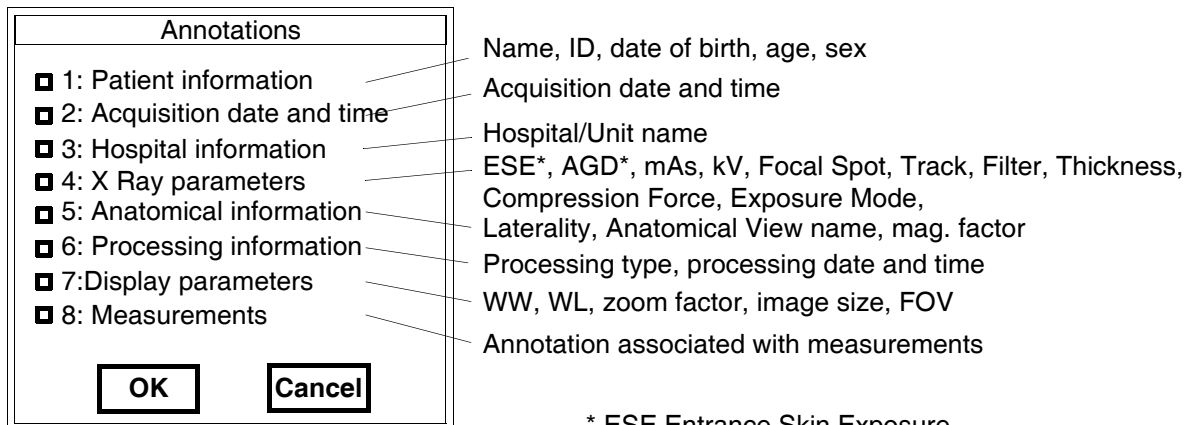
Full: All annotations are displayed.

Partial: A predefined subset of annotations is displayed. This facility is not available when viewing SCPT images.

None: No annotation is displayed on the image.

Custom: This button opens the Custom window (shown below) with the list of available annotation groups. This facility is not available when viewing SCPT images.

Custom Annotations window:



* ESE Entrance Skin Exposure

*AGD Average Glandular Dose

- A small square button is displayed next to each group. To select the annotation groups that you want displayed, click on the corresponding button. To deselect a group, click on the button a second time.
- Click on **OK** to use the selected annotations, or on **Cancel** to cancel the operation.

3-3 Graphics and measurements

These buttons allow you to add graphic and text annotations to the image, and perform measurements. You can add several graphic annotations (line segments and ellipses) on the same image. Each annotation is identified by a number, which is displayed next to it. The corresponding measurements, with the same identification number, are displayed in the bottom right corner of the image.

Only the three most recent measurements are displayed. To recall an earlier measurement value on the screen, click on the corresponding line segment or ellipse.

Segment

- Click the **Segment** button to place on the image a line segment that you can use to measure the distance between two points.
 - The squares at each end of the segment are called handles.
 - Press and drag on either of the handles to move the corresponding end of the segment to the desired position. The size and angle of the segment follow the movement of the handles.
 - To move the whole segment, select the segment by clicking on any point along the line (except the handles) and drag the segment to the desired position.



The length of the segment (in millimeters) and the angle between the segment and the vertical (in degrees) are displayed in the bottom right corner of the image.

Ellipse

- Click the **Ellipse** button to place on the image an ellipse, that you can use to highlight an area of interest, or to measure the area delimited by the ellipse.
 - The ellipse is displayed with four handles around it, four tick marks on the ellipse itself, and a cross mark in the center.
 - To change the size and shape of the ellipse, press and drag on the handles.
 - To rotate the ellipse around its center, press and drag on any of the tick marks.
 - To move the actual ellipse, press anywhere on the ellipse (except for the tick marks), or on the center cross, and drag the ellipse to its desired position.



The area of the ellipse (in square millimeters), and the mean and standard deviation of the pixel values within the ellipse, are displayed in the bottom right corner of the image.

CAUTION

All measurement calculations for graphical annotations (length, surface area, etc.) are made in a reference plane which is 2 cm above the breast contact surface. These values therefore do not correspond to the true size of a pathological feature unless it is situated in the reference plane.

Pixel gray levels in raw images are linearly proportional to the X-ray dose received by the detector. Gray levels in processed images are proportional to the logarithm of the dose.

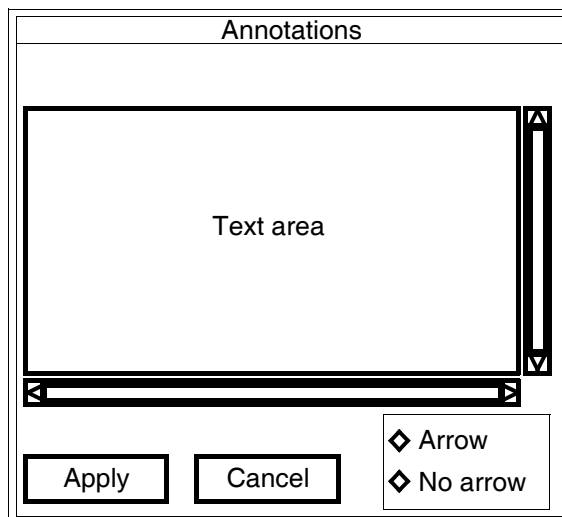
Text annotation

- This function allows you to add text annotations on the image, for example to highlight a specific point for further reference, or as a communication tool for another practitioner.

Click the button marked **aA** to open the **Annotations** window, shown below:



Annotations Window



- Move the mouse pointer inside the text area. You can now enter the required text.
- Use the **<Enter>** key to start a new line. To make corrections, move the mouse pointer to the desired place and click, to position the text cursor. You can now insert text, or use the **<Backspace>** key to delete text.
- An arrow pointing to the area of interest can be attached to the annotation. To do this, select the small square next to **Arrow**.
- When you have entered the text, click the **Apply** button. The window closes, and the text annotation appears on the image.
- To position the text annotation, select it and drag it to the desired position.
- If you chose to attach an arrow, you can now also select the tip of the arrow and drag it to the desired position. The length of the arrow is adjusted automatically.

Note:

Annotations added by the operator on the AWS are present only on the AWS and on images printed from the AWS. They are lost during image transfer to another workstation.

Displaying and Removing User Annotations

To hide all user annotations (graphics and text) on an image *temporarily*:

- Click the **Hide/Show** button.
- To display the annotations again, click the button a second time.



The button legend alternates between **Hide** and **Show**. When **Hide** is displayed, other measurement tools are not available.

To delete a user annotation (graphic or text) *permanently*:

- Select the annotation by clicking on it. The annotation is highlighted.
- Click the **Eraser** button to delete the highlighted annotation.



To delete ALL USER annotations (graphics and text) present on the image *permanently*:

- Click the **Erase all** button. You are asked to confirm the deletion (**Yes or No**).



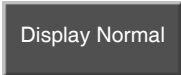
Note:

The system annotations cannot be deleted, but you can use the Annotation Level buttons to set the amount of system annotation displayed. See section [3-2 Annotation Level on page 108](#) above.

3-4 Geometric transformations

The buttons in this area of the panel allow you to flip or rotate the image to improve viewing comfort or for easier comparison with other images.

- Click the button for the desired action.
 - Flip image around horizontal axis.** The top of the image becomes the bottom, and vice-versa. Left/right orientation is unchanged.
 - Flip the image around vertical axis.** The left of the image becomes the right, and vice-versa. Up/down orientation is unchanged.
 - Rotate the entire image 90 degrees to the left.**
 - Rotate the entire image 90 degrees to the right.**
- Click **Display Normal** to return the image to the initial orientation (regardless of how many flip and rotate operations were performed).

3-5 change view name

3-5-1 Overview of change view name

It may occur that when viewing an image, the user realizes that the view name displayed is incorrect. The change view name function allows the user to modify the laterality and view name of an image just acquired without repeating the exposure.

- The function is not available in Stereotaxy mode.
- The function is available in (active) Acquisition mode only, not in Review (i.e. only before the examination is closed).
- laterality and view name changes can be applied to:
 - The raw and processed images just acquired.
 - Any re-processed images of the current examination.

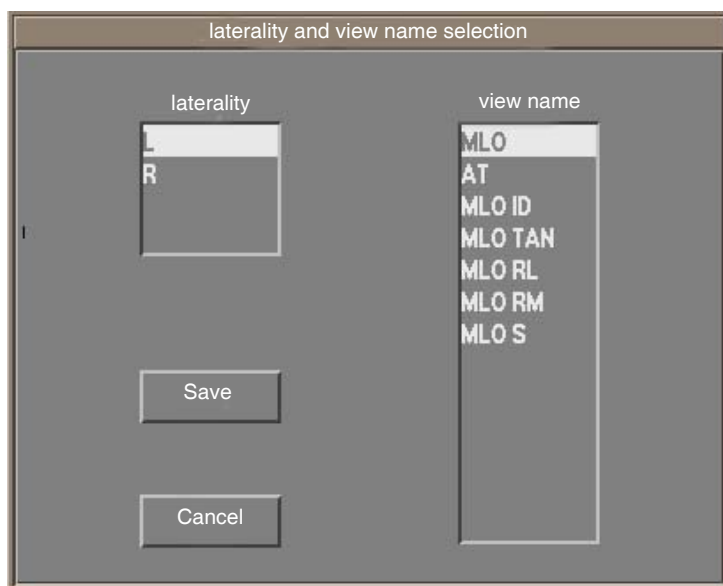
! Notice:

For recumbent patients, view names can only be changed to recumbent view names. For standing patients, view names can only be changed to standing view names. To change view name from recumbent to standing, or vice-versa, the exposure must be repeated.

3-5-2 How to use change view name

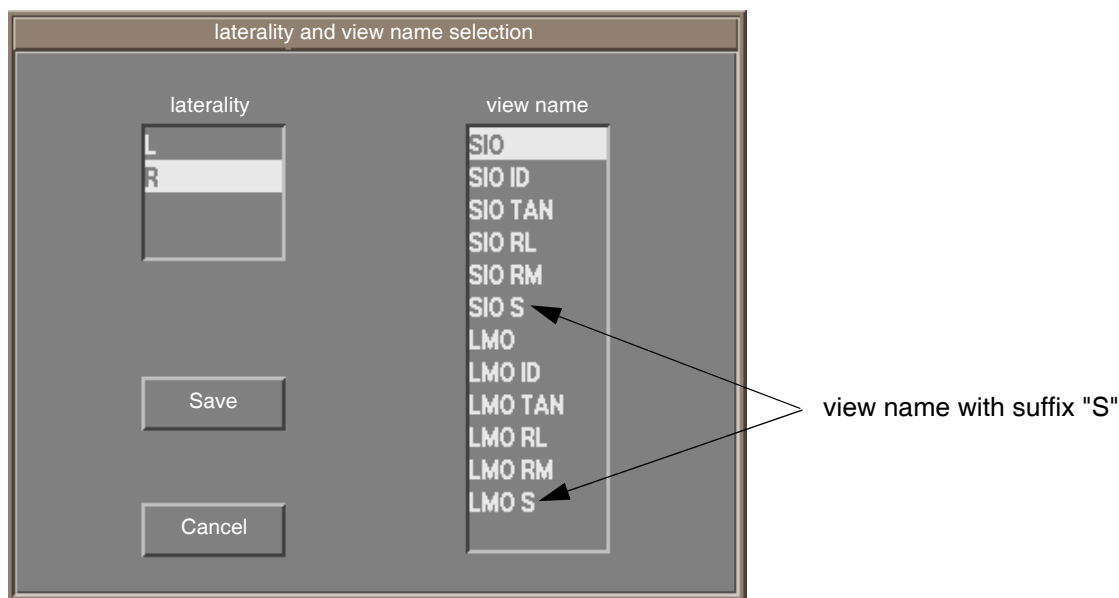
Assuming that you have already taken an exposure and obtained the raw and processed images, proceed as follows:

- Check the laterality displayed on the image. If you find that you have incorrectly selected it on the X-ray Console, then proceed to the steps given below.
 - Before closing the exam, open the Annotations panel.
 - Click **change view name** button: The *laterality and view name selection* Control Panel appears



In example above: Default selections of laterality and view name are displayed in the panel for an image acquired with laterality = L and positioner angle = - 35°

- In this panel, select the correct laterality (R in the present example) and the view name. The list of laterality/view name available depends on position of the gantry; see section [4-1 .View names on page 39](#) in Chapter 4 *X-ray Console* for the complete list in all positioner configurations.



New view name list after laterality selection = R
for an image initially acquired with laterality = L and positioner angle = -35°

Note:

The view prefix cannot be modified: if a Mag Stand was present for the image acquired, the prefix ("M") is automatically kept for the view name.

CAUTION

The view suffix can be modified as desired unless the acquisition has been done with a spot compression paddle (with or without magnification). In that case, select only a view name with suffix "S". On the other hand, if the acquisition was NOT done with a spot compression paddle, DO NOT select a new view name with the suffix "S". If these directions are not followed, there is a risk of inconsistency with the processing applied.

- At this point, you can either Cancel or Save the selection.
 - If you click **Cancel**, the laterality for the raw, processed, and all reprocessed images from this raw, remains as previously selected (i.e. "L" in the present example).
 - If you click **Save**, the new laterality applies for the raw, processed and all reprocessed images from this raw (i.e. "R" in the present example).

3-5-3 Resulting image display

The currently displayed image may be rotated by 180° on the monitor, depending on the chosen view name, as described in the table below:

New view name selected	laterality chosen	Impact on image display on the monitor
CC XCCM XCCL FB	R	The image is displayed with chest wall on the RIGHT.
	L	The image is displayed with chest wall on the LEFT.
CV MLO AT SIO LMO LM ML	Does not matter.	180° rotation is not applied.

3-5-4 Printing the image

The new laterality and view name are taken into account when the image is printed:

- The new laterality and view name are printed.
- The printed image is consistent with the image displayed in the Viewer (if chest wall side is displayed on the right of the Viewer, it is printed on the right of the film as well).

4 Function Panel

The Function Panel is used to exit from the Viewer, as well as for access to information on the Medical Procedure Card, *Scrapbook*, *Quality Check*, *Image reprocessing*, *Print to laser camera*, and *Middle mouse button* functions.



4-1 Medical Procedure Card

Click this button to view information on the currently selected patient.



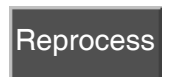
4-2 Scrapbook

Click this button or press the <F3> keyboard button to open the Scrapbook. This allows you to position selected images on Scrapbook "pages", ready for printing. See section [5 Scrapbook on page 121](#) for more information.



4-3 Reprocess

Click this button to apply the selected primary processing algorithm to the currently selected image. If the image has already been correctly processed, or if it is an SCPT image, the operation will have no effect on the image, but a new processed image, identical to the first one, will be created.



4-4 Close exam (Exit Viewer)

Click this button to leave the Viewer. If an exam has been reviewed with no changes, the Viewer closes with no message.

- If changes have been made to image WW or WL, a confirmation box is displayed (**Exit with save**, **Exit without save**, **Cancel**).
- If New Acquisition has been selected, but closed before images were acquired, a confirmation box is displayed (Yes or No).



4-5 Quality Check

Two cases are possible for the Quality Check function: With Repeat and Reject Analysis (RRA) either enabled, or disabled.

4-5-1 Case 1: RRA enabled

4-5-1-1 Introduction

If you determine that an image is of satisfactory quality, the qualification level Accepted is applied by default, and Auto Push and/or Auto Print transfers are triggered by default when the exam is closed. On the other hand, if you decide that an image has to be repeated or rejected, you must qualify it as such.

In all cases, each image's qualification level is recorded in a specific database when the exam is closed. You can apply one of three qualification levels to an image: Accepted (default level), Repeated or Rejected, with the consequences on image transfer (Auto Push and Auto Print) as indicated in the table below:

QUALITY CHECK Buttons		
First Selection	Second Selection	Consequence on Image Transfer
QUALITY CHECK OK	Accepted (default level)	Auto Print and/or Auto Push, according to settings in Medical Application preferences window.
QUALITY CHECK NOK	Repeated (selected level)	If Auto Print/Auto Push are set to ON in the Medical Application preferences window: Auto Print/Auto Push functions behave according to the settings in the Quality Check panel in the Medical Application preferences window.
	Rejected (selected level)	If Auto Print/Auto Push are set to OFF in the Medical Application preferences window: Auto Print/Auto Push functions do not operate, regardless of the settings in the Quality Check panel in the Medical Application preferences window.

Qualification does not modify the image itself; it only records the applied image qualification level in a specific database on the AWS. All qualification statistics are generated from this database.

Rejected Images

Most of the time these are non-clinical images, such as Calibration or QC images. Occasionally a clinical image may not be worth keeping or the operator will choose not to retake the same view.

Repeated Images (to be retaken)

In the RRA feature, Repeated means that the corresponding view will have to be retaken, or has been retaken. An image can be qualified as Repeated either before or after the view has been retaken.

It is the responsibility of the user to actually retake the exposure. The examination should not be completed before the exposure has been retaken.

Repeated or Rejected Images

Images qualified as Repeated or Rejected are not deleted from the AWS database.

Even in the specific case with:

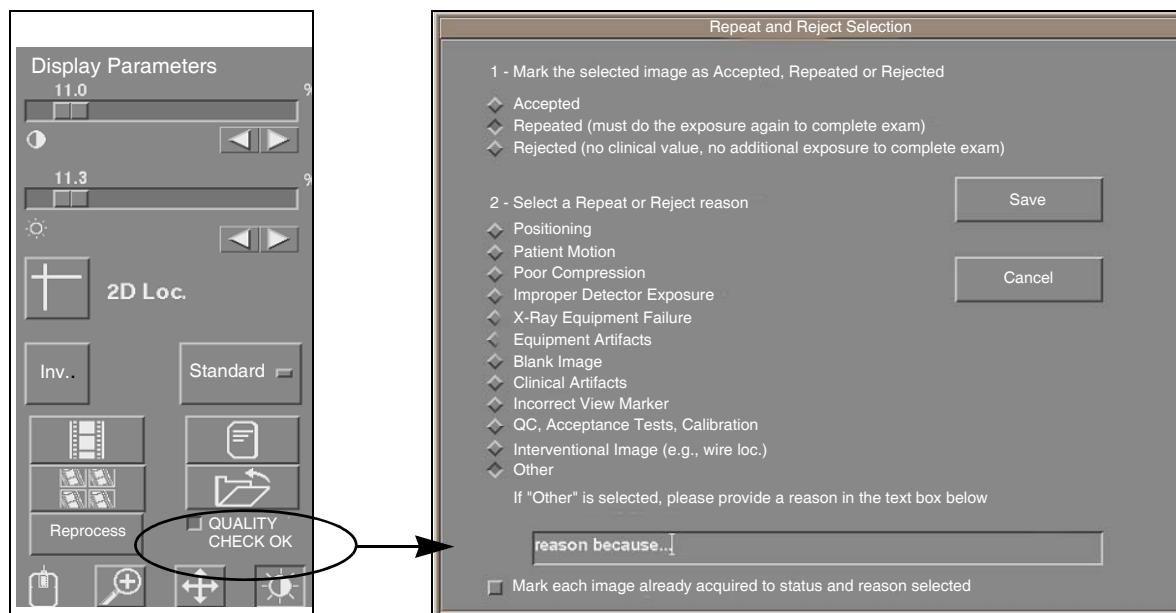
- Auto Push Repeated images? and Auto Push Rejected images? both set to NO in Medical Application preferences, Quality Check part,
- Storage commitment activated on the station,
- Auto delete: ON,

the Repeated and Rejected images are not deleted unless they are manually pushed to a host.

4-5-1-2 Procedure to qualify an image

1. While viewing a processed image in acquisition mode, the QUALITY CHECK OK button in the Viewer Function panel indicates the current level (QUALITY CHECK OK or QUALITY CHECK NOK): default level is QUALITY CHECK OK.

If you decide that the quality of an image is not satisfactory, click the QUALITY CHECK OK button to open the Repeat and Reject Selection window:



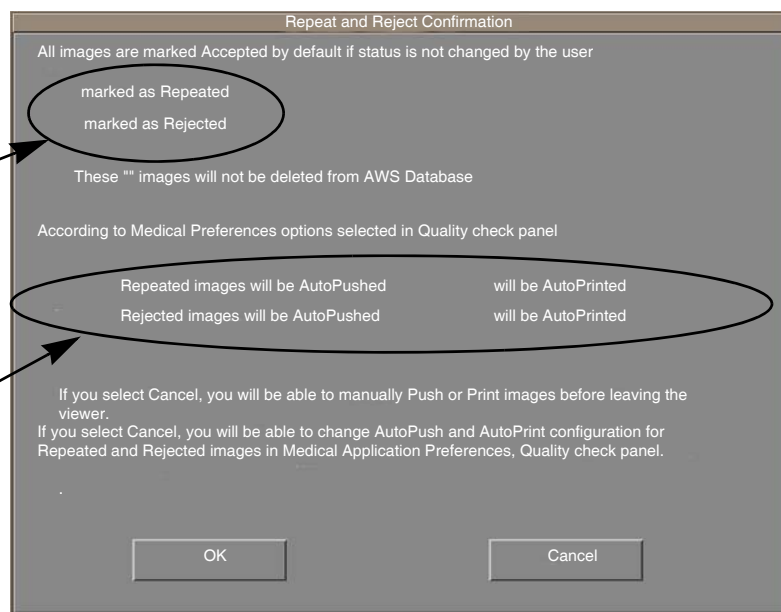
2. Qualify the image as either Repeated or Rejected, then select the associated reason in the list provided. If the reason chosen is Other, a text field is available to type in a customized reason.

Click Save: If Repeated or Rejected was selected, the QUALITY CHECK button indicates QUALITY CHECK NOK.

This new qualification level is applied to both images (raw and processed).

Image Qualification

Planned Auto Push and Auto Print actions, as defined in Medical Application Preferences, Quality Check part.



3. After all images are qualified as desired, close the examination: The Repeat and Reject Confirmation panel is displayed before closing, summarizing the image qualification and the planned Auto Push and Auto Print actions.
4. Once you agree with the content of the Repeat and Reject Confirmation panel, click OK. The usual popup for the final exit then appears.

4-5-2 Case 2: RRA disabled

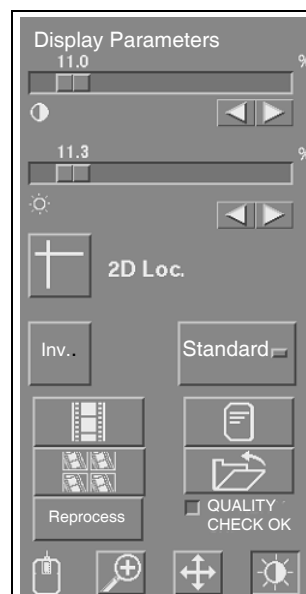
4-5-2-1 Introduction

You can apply one of two qualification levels to an image: QUALITY CHECK OK or QUALITY CHECK NOK, with the consequences on image transfer (Auto Push and Auto Print) as indicated in the table below:

QUALITY CHECK Button	Consequence on Image Transfer
QUALITY CHECK OK	Auto Print and/or Auto Push, according to settings in Medical Application preferences window.
QUALITY CHECK NOK	Auto Print/Auto Push functions do not operate.

4-5-2-2 Procedure to qualify an image

While viewing an image (raw or processed) in acquisition mode, the QUALITY CHECK button in the Viewer Function panel indicates the current level (QUALITY CHECK OK or QUALITY CHECK NOK). Click the button to toggle the image qualification between the two possible levels. The new value is applied to both images (raw and processed).



4-6 Print to laser camera

Click this button to print the displayed image to a Laser camera (if present). Refer to Chapter 13 [Printing](#).



4-7 Middle Mouse button

Click one of the buttons on this panel to select one of three functions to be performed by the middle mouse button. See below for descriptions of these functions; the default is Contrast/Brightness control (WW/WL).



4-7-1 Magnifying glass

Provides a magnified view (x 2) of part of the image in a moveable square zone. If the initial zoom of the image is *True Size*, *Fit to Screen* or *Zoom=1/2*, zoom factor inside the magnifying glass is 3, which corresponds to a full resolution display (each pixel on the screen corresponds to a pixel on the Digital Detector).

If the initial zoom of the image is *Zoom=1*, zoom factor inside the magnifying glass is 6, which corresponds to a double resolution display (a pixel on the digital detector is displayed on 4 pixels on the screen).

- To select the function, click with the left mouse button on the **Magnifying glass** button.
- To use the function, move the mouse pointer to the part of the view you are interested in; press and hold the *middle* mouse button.



Any annotations or graphics in the magnified zone temporarily disappear.

4-7-2 Image scroll

When all of an image is not visible, for example when you have magnified an image by using the Zoom function, this function allows you to move the visible window around the image.

- Click with the left mouse button on the **Scroll** button to select the function.
- To use the function, move the mouse pointer onto the view; press and hold the middle mouse button to move the image as required.



If the full content of the image is already displayed, the Image Scroll function has no effect.

4-7-3 Contrast/Brightness control

This function allows image contrast and brightness to be adjusted by moving the mouse.

- Click with the left mouse button on the **Contrast/Brightness** button to select this function.
- To use the function, move the mouse pointer onto the view; press and hold the middle mouse button:



Contrast is controlled by a horizontal movement of the mouse, to the left for more contrast, and to the right for less.

Brightness is controlled by a vertical movement of the mouse, up to decrease brightness, and down to increase it.

Note:

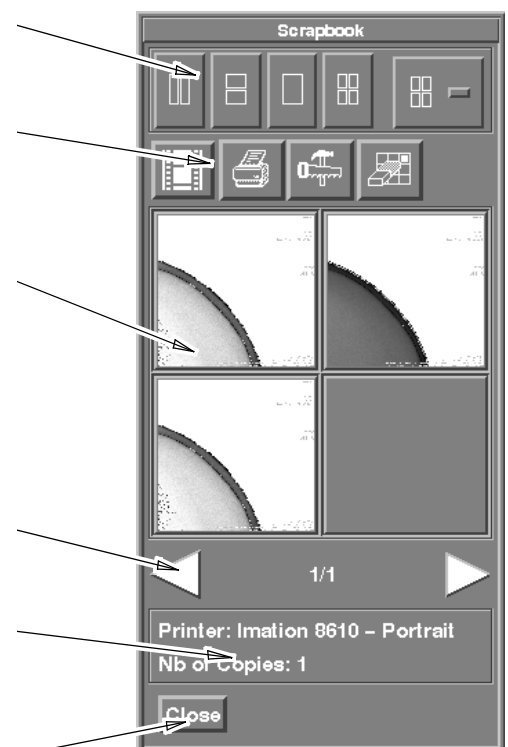
Image contrast and brightness can also be adjusted using the Contrast and Brightness sliders, or the Auto Contrast control, all available from the View Control Control Panel.

5 Scrapbook

CAUTION

The Scrapbook function allows more than one image to be printed on a single film for ease of comparison and reference. **DO NOT** use any images printed from the Scrapbook for diagnostic purposes.

- The Scrapbook function allows the user to select images and arrange them in any desired order for printing, by positioning them on "virtual pages" in the Scrapbook. Pages can contain multiple images, according to the layouts available with the currently selected printer, and each page can have a different layout. Pages can be sent for printing individually or all at once.
- A "delete after print" option can be turned on or off, as required. It causes pages to be automatically deleted after printing.
- Only images from a single patient can be loaded into the Scrapbook at one time. Images may be loaded from different exams; a warning is displayed when the first image of the new exam is loaded.
- To use the function, either click the Scrapbook button on the Viewer Control Panel (see section [4-2 Scrapbook on page 115](#)) or press the <F3> keyboard function button. The Scrapbook window is displayed:
- *Layout Formats*. Use these buttons to select the format desired for the current page. See description below.
- *Scrapbook functions*. Use these buttons to select Scrapbook functions; *Print*, *Print Menu*, *Options Menu*, and *Delete Menu*. See descriptions below.
- *Composer area*. This area shows the contents of the current Scrapbook page. It is divided into slots for images, according to the selected layout for the page. Use this area to add and remove Scrapbook images. See description below.
- *Page navigation area*. Use the arrows to display the next or previous pages. See description below.
- *Printer information area*. Shows the current printer settings.
- *Close button*. Use this button to close and empty the Scrapbook. If the Scrapbook contains unprinted images, a warning dialog box asks for confirmation of the Close action.



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5-1 Layout formats

Layout Formats. Four user-defined buttons show available formats for page layouts. These are usually: 2x 2, 1 x 2, 2 x 1, and 1 x 1.

Select the format desired for the current page by clicking on the appropriate button.



- If the currently selected printer has been configured to allow more than four layouts, the additional layouts can be selected in two ways:
 - Click the fifth (rightmost) button to display a menu of all page layouts available for the current printer; select the desired layout from the menu to apply it to the current page.
 - The user-defined buttons can be reprogrammed to select different layouts; refer to *Options Menu* in section [5-2 Scrapbook functions on page 122](#).

5-2 Scrapbook functions

Print

Click this button to print all pages of the Scrapbook.



Print Menu

Click this button to display a menu of print options:

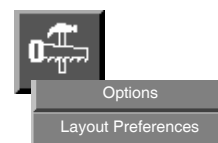
- *Print page*: Prints the contents of the current Scrapbook page.
- *Print all pages*: Prints all pages of the Scrapbook.
- *Printing status*: Displays the Printing status panel (see Chapter [13 Printing](#)).
- *Printer Configuration*: Displays the Print Manager panel.



Options Menu

Click this button to display a two-line pull-down menu:

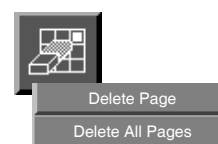
- Select *Options* to display a checkbox which allows you to enable or disable the "delete after print" option.
- Select *Layout Preferences* to display a menu of all page layouts available for the current printer. To reprogram one of the user-defined layout buttons (section [5-1 Layout formats on page 122](#)), select the desired format and apply it to the button by "drag and drop".



Delete Menu

Click this button to display a two-line pull-down menu:

- Select *Delete Page* to remove the current page from the Scrapbook.
- Select *Delete All Pages* to remove all pages from the Scrapbook.



5-3 Composer area

This area displays the image or images held on the current Scrapbook page in thumbnail (reduced size) form. Each thumbnail displays the full image, with the same settings (brightness, contrast, invert, rotate, and flip) and the same graphic annotations as the image displayed in the Viewer. However the Zoom and the position of the image if it has been roamed in the Viewer are not taken into account, either for display or when printing.

Use the area to add and remove Scrapbook images:

- Use the right mouse button to "drag and drop" an image from the Mosaic Image Browser to an empty slot on a Scrapbook page displayed in the Composer area.
- Press the keyboard function key <F4> to load the image currently displayed in the Viewer into the next free slot of the current page of the Scrapbook. If there is no free slot, a new empty page is created and displayed, with the same layout format as the current page.
If the Scrapbook is not open, the <F4> key has no effect. If the mouse cursor is left over the Scrapbook window, the <F4> key has no effect.
- To remove an individual image from the Scrapbook, click with the right mouse button on the thumbnail image in the composer area, and answer Yes to the delete confirmation dialog which is displayed.

5-4 Page navigation area

- This area displays the current page number and the total number of pages in the Scrapbook, and contains two navigation arrows:
- Click the left arrow to display the contents of the previous page; if the current page is the first page, a warning message is displayed.
- Click the right arrow to display the next page. If the current page is the last one, a new empty page is created and displayed, with the same layout format as the current page.



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Chapter 12 Image Acquisition Procedure

1 Overview

This chapter explains the procedure for standard examinations using the Senographe DS, from the preparatory tasks to be performed on the equipment (selection of exposure mode, configuration, etc.) through patient positioning, with notes on the exposure sequence and image processing. In section [5 Manual Mode on page 129](#) you will find a table of suggested parameter settings.

An exam using the Senographe DS acquisition application is performed in exactly the same way as a conventional exam (e.g., using a Senographe DMR) in terms of operation and patient positioning.

The major difference is that you use a Digital Detector instead of a conventional film/screen cassette. The images are available on the AWS monitor within a few seconds after the exposure.

Immediately after acquisition, the raw image is displayed for a few seconds. It is then replaced by the processed image. Images of earlier exams can be recalled from the image disk for review.

2 Preparation

2-1 Worklist

Exposures can only be made after patient/exam selection from the Worklist (see Chapter [9 Worklist](#)).

If the examination has not been scheduled and included in the Worklist, a new entry can be made, but image acquisition is not permitted until basic patient information has been recorded in the system and laterality has been selected. After selection of the patient for whom you want to start acquiring images, click the Start Exam button to continue with image acquisition. The Viewer window (see Chapter [11 Viewer](#)) opens, and exposures are permitted once you have selected the breast laterality on the console.

2-2 Preparing the equipment

Configure the system for the required view, contact or magnification. The digital detector incorporates a removable grid (Bucky). For magnification views the Bucky is removed and replaced by a magnification stand. See section [3 Configuration on page 126](#).

Configure the field size to be used.

Install the appropriate compression paddle. Check that the type of paddle is correctly recognized by the system and displayed on the Gantry readout. Paddles not designed for use with the system may give incorrect results.

No specific tube warm-up procedure is needed at power on.

Choose the appropriate exposure mode. This may be AOP mode (Automatic Optimization of Parameters), described in section [4-1 Definition of AOP on page 127](#), or Manual mode, described in section [5 Manual Mode on page 129](#).

Use of the AOP Mode provides the best quality/dose compromise, according to the priority selected by the operator, but is not suitable for all examinations.

3 .Configuration

3-1 Standard exposures

- For standard exposures (contact examinations, made with the Bucky in place), the large focal spot is selected by default. Exposures are not permitted if the small focal spot is selected. Check on the control panel display that the focal spot selection is shown as *Large*.

3-2 Magnification

- For magnification exposures, the Bucky must be removed and replaced by a magnification stand. The small focal spot is selected by default. Exposures are not permitted if the large focal spot is selected. Check on the control panel display that the focal spot selection is shown as *Small*.
- Always make sure that the magnification stand is correctly locked in place before starting an exam.
- The object-detector distance depends on the magnification factor required. See Chapter 3 [Senographe DS Gantry and Generator](#) for available magnification factors.
- In Manual mode, increasing the kV setting by 1 or 2 kV will reduce exposure time.

3-3 Examination of chest wall

Select configurations and kV values to suit the thickness and density of the region examined.

Use of the grid is recommended.

4 AOP - Automatic Optimization of Parameters

4-1 Definition of AOP

AOP (Automatic Optimization of Parameters) automates radiation controls by optimizing the exposure parameters.

It can be used for contact exposures, magnified exposures, or for the examination of the chest wall. See section [3 .Configuration on page 126](#) for additional notes on configuration.

Before each exposure made in AOP mode, a brief absorption measurement exposure is made to determine the thickness and density of the breast being examined. This information, together with the priority set by the operator, allows optimization of exposure parameters.

AOP automatically selects the following parameters:

- Anode track (Mo or Rh)
- Filter (Mo or Rh)
- kV value
- mAs value

The exposure is then made, using the track/filter/kV/mAs configuration which supplies the lowest dose with respect for the operator's imaging priority.

4-2 Usage of AOP Mode

The operator chooses one of three modes, according to the priority required:

- CNT Contrast Gives priority to subject contrast.
- STD Standard Selects a compromise between contrast and dose.
- DOSE Dose Gives priority to dose reduction.

Note:

By default, the system selects the large focal spot when a contact exam is selected, and the small focal spot when magnification is selected. Exposures are not possible if these settings are overridden.

Note:

GE recommends that Standard (STD) and Dose (DOSE) modes be used for routine mammography. The Senographe DS Contrast (CNT) mode delivers more dose than Standard and Dose modes. GE recommends that Contrast mode be used only after consultation with an interpreting physician or radiologist.

Note:

To fulfill the requirements of certain countries, access to Contrast Mode can be restricted as described in the Service Documentation.



Breast compression of at least 3 daN (30 newtons or 6.7 pounds) is essential when using the AOP mode.

4-3 AOP configuration at installation

4-3-1 Classic Tables versus Profile Tables

For each AOP mode, two sets of optimized exposure parameters are available on the Senographe. These are called Profile Tables and Classic Tables.

The Profile Tables have been created to provide an additional way to manage the trade-off between image quality and patient dose by changing some of the selections of exposure parameters for particular breast thickness and composition combinations. The changes in exposure parameter selection are expected to affect Contrast to Noise Ratio (CNR) and Average Glandular Dose (AGD).

It is important to understand that any improvement in CNR is done at the cost of an increase in AGD and vice versa; a reduction in AGD yields a diminished CNR. If the site operates in the Contrast mode, and the emphasis is on imaging mid-sized breasts, Classic Tables may be preferred. If the emphasis is on imaging larger breasts, Profile Tables may be preferred. If the site operates in the Standard or Dose mode, and the emphasis is on imaging larger breasts, Profile Tables may be preferred. It is the radiologist's responsibility to make the choice between configuring Profile Tables or Classic Tables.

4-3-2 Configuration process

At installation, one table or the other must be configured for each of the three AOP modes. The desired configuration must be set with the Field Engineer. Note that this choice may be constrained due to regulations in force in certain countries. These are explained in the Service Manual, and must be discussed with the Field Engineer.

Once the Senographe is installed, should you need to know which of the tables have been set; please contact your Field Engineer.

4-4 Use of markers in AOP Mode

The algorithm used in AOP mode searches for the most dense part of the breast, and uses this as a reference in its calculations. It is therefore important to avoid the presence of dense objects in the area used by the algorithm.

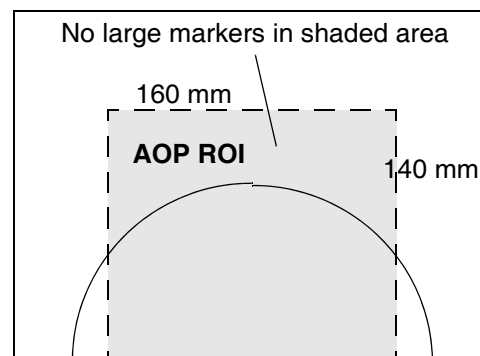
When using AOP mode, do not place large markers such as view name markers in the area used by the AOP algorithm. They may be used anywhere outside this area. Small markers with an area no greater than 2 mm², such as BB markers up to 1.6 mm in diameter, may be used as required.



Do not use any radio-opaque markers other than BB markers within the AOP ROI.

BB markers having diameters up to and including 1.6 mm diameter may be used. Larger markers will affect the calculation of tissue density, which may lead to a degraded image.

In contact mode exposures using AOP, the region used to identify the densest part of the breast has an area of 160 mm by 140 mm, is adjacent to the chest wall side and, is centered on the image receptor (the shaded area in the diagram).



4-5 Mammary implants

Use of AOP mode is not recommended for examinations of patients with mammary implants. Manual mode should be used.

5 Manual Mode

The Manual Mode can be used for standard exposures, implant views, magnified exposures, for the examination of the chest wall, and for examination of biopsy specimens and cores. See section [3 .Configuration on page 126](#) for additional notes on configuration.

The operator selects the following parameters:

- Focal track (Mo, Rh)
- Filter (Mo, Rh)
- kV
- mAs

Note:

By default, the system selects the large focal spot (0.3) when a standard exam is selected, and the small focal spot (0.1) when magnification is selected. Exposures are not possible if these settings are overridden.

Select the desired track/filter configuration according to the thickness and density of the breast to be examined, then select suitable kV and mAs values.

Note that while the examination of a very dense breast using the rhodium or molybdenum tracks provides similar contrast images, the same breast examined via the rhodium track benefits from better tissue visualization and a lower average glandular dose.

Refer to [Table 1 Suggested manual techniques on page 130](#) below for suggested parameter selections according to breast type and thickness.

[Table 2 Maximum and recommended kV ranges on page 130](#) lists available maximum and recommended kV ranges.

For thick (>6 cm) or dense breasts, the Mo/Rh and Rh/Rh configurations may provide equivalent or better image quality with reduced patient dose.

Although subject contrast depends on the kV value used, note that an increase in the kV value may reduce the radiation dose to the patient. Potential contrast losses will be handled by digital image processing.

A reduction in the kV value improves contrast but increases the radiation dose to the patient.

In Manual mode, the choice of priority to dose reduction or to the desired contrast is left to the discretion of the operator.

Note:

If the operator makes a filter selection error, the system automatically changes the filter. A warning message appears on the first line of the console readout.

Table 1 Suggested manual techniques

Compressed breast thickness (mm)	Homogeneously fatty			50% fatty, 50% dense			Homogeneously dense		
	Target/Filter	kVp	mAs	Target/Filter	kVp	mAs	Target/Filter	kVp	mAs
<i>With grid (contact examination):</i>									
< 30	Mo/Mo	25	32	Mo/Mo	26	28	Mo/Mo	26	36
30-40	Mo/Mo	26	36	Mo/Rh	26	45	Mo/Rh	27	50
40-50	Rh/Rh	28	50	Rh/Rh	29	56	Rh/Rh	29	63
50-60	Rh/Rh	29	56	Rh/Rh	29	63	Rh/Rh	30	71
60-70	Rh/Rh	29	71	Rh/Rh	29	80	Rh/Rh	30	80
70-80	Rh/Rh	29	80	Rh/Rh	30	90	Rh/Rh	31	80
> 80	Rh/Rh	30	90	Rh/Rh	30	140	Rh/Rh	31	140
<i>Without grid (magnification examination):</i>									
< 30	Mo/Mo	25	25	Mo/Mo	26	36	Mo/Mo	27	56
30-40	Mo/Mo	26	36	Mo/Mo	27	56	Mo/Rh	27	63
40-50	Mo/Rh	28	56	Rh/Rh	29	71	Rh/Rh	30	71
50-60	Rh/Rh	29	71	Rh/Rh	30	80	Rh/Rh	31	71
60-70	Rh/Rh	30	71	Rh/Rh	31	80	Rh/Rh	32	80
70-80	Rh/Rh	31	80	Rh/Rh	32	90	Rh/Rh	33	80
> 80	Rh/Rh	32	80	Rh/Rh	33	110	Rh/Rh	35	125

Table 2 Maximum and recommended kV ranges

TRACK	FILTER	KV RANGE	
		MAXIMUM	RECOMMENDED
Mo	Mo	22 thru 32	25 thru 28
Mo	Rh	22 thru 40	26 thru 30
Rh	Rh	25 thru 49	28 thru 35

6 Positioning the patient

Women undergoing a mammography examination often feel apprehensive because of the examination and the ensuing diagnosis.

To reassure the patient, receive her in a warm room and provide a simple but precise explanation of the procedure. Pay particular attention to breast compression, which can cause discomfort, but is essential in order to produce a high quality exam and ensure reliable diagnosis.

It is best to examine the breast during the first half of the menstrual cycle (1st through 14th day). The breasts are less tender and less painful before ovulation.

Examination of the breast requires the patient to disrobe from the waist up. An appropriate cover should be provided during the waiting period.

It is important to relax the patient. Any contraction of the pectoral muscles or muscles of the arm can cause an error in positioning.

Elevate the breast and center it on the image receptor over all its surface:

1. Remove folds from the skin.
2. Bring out the nipple and position it in profile when possible. Do not sacrifice breast tissue for nipple profile.
3. Bring out the inframammary angle for applicable views.
4. Compress until the breast surface is taut to the touch (see section [7 Compression on page 132](#)). Take great care with patients with mammary implants.
5. Use the centering light to check the field size, and ensure there are no artifacts obscuring the breast (e.g. hair, earrings, etc.).

7 Compression

To apply compression to the breast, depress the compression pedal. Manual adjustment can be made using the two knobs, one located on each side of the compression paddle holder. Take great care with patients with mammary implants. The compression force is displayed on the Gantry readout panel, and can be displayed on the image as an annotation (see Chapter 11 [Viewer](#)).

The maximum compressive force available using motorized compression is 20 daN. Using manual compression, the maximum force available is between 27 daN and 30 daN with the arm in the 0° position, reducing to about 20 daN at 90°. An audible warning is given when the limit has been reached.

It is important to use adequate breast compression because the benefits in image quality and dose reduction are significant:

- Compression reduces motion blurring by immobilizing the breast.
- Compression reduces geometric blurring by ensuring direct contact between the breast and the image receptor and by spreading glandular breast tissue.
- Compression improves subject contrast and reduces scattered radiation in proportion to the reduction in thickness of tissue irradiated.
- Compression spreads the breast laterally, giving it a uniform and reduced thickness. This reduces exposure and consequently the mean glandular dose.

Good compression is obtained when the compressed breast is taut to the touch.

When using the flexible compression paddle provided with your system, please use the collimator centering light after final compression is achieved and before acquiring the image, to verify that the chest wall side of the paddle is not flexed into the field of view. If the paddle wall is observed in the FOV, please reposition the patient so that her chest wall does not push the paddle wall forward. If that is not possible, switch to the standard compression paddle.

Note:

As a safety measure, the compression system is designed to avoid having the paddle fall in the event of power loss. If power loss occurs during an examination, the current compression force remains applied to the compression paddle. Disengage the patient by lifting the paddle gently (do not try to lift it quickly), using the manual compression knobs.

Note:

Automatic decompression can be programmed to occur when the exposure is terminated, so as to minimize the time spent under compression by the patient. Refer to Chapter 4 [X-ray Console](#), section 3 [X-ray Console setup menus on page 37](#).

If automatic decompression is not enabled, decompress the patient after the exposure by pressing the compression release button  located at the lower right of the X-ray Console.

CAUTION

If a 2D localization paddle is being used, automatic decompression **MUST BE DISABLED**.

CAUTION

If the compression paddle is not present, take care to leave the space free between the bottom of the paddle holder and the top of the image receptor assembly.

8 Thickness display

The thickness of the compressed breast is used in determining the average glandular dose (AGD), and for AOP calculations. It appears on the Gantry readout, and can be displayed on the image as an annotation (see Chapter 11 [Viewer](#)).

- If a valid compression paddle is detected, the actual compression thickness is displayed, whatever the compression force (even if it is lower than the minimum force required for AOP).
- If no compression paddle is mounted or if a non valid compression paddle is detected, the compression thickness display remains blank.
- The compression thickness taken into account by the system for exposure parameters and displayed on the image is the value shown on the Gantry readout when the Operator presses the Prep button



on the X-ray Console.

Note:

When making an image with no compression, or using a compression force less than the minimum force required for AOP, the compressed breast thickness displayed on the image and recorded in the image file is 45 mm. The ESE and AGD are then computed assuming a breast thickness of 45 mm, except in the case of extreme thicknesses for which the AGD computation cannot be done, which result in a displayed AGD of 0. An extreme thickness is a compressed breast thickness either less than approximately 20 mm or greater than approximately 80 mm.

9 Image acquisition

Note:

When Right/Left image pairs are acquired, it is recommended that the Right image should always be acquired before the Left. This ensures consistent display when using the 2 x 1 view; when the image acquired first is selected, the pair is displayed with the two chest walls in the center of the screen.

- The image acquisition function must be entered from the Worklist **function**. **Select the correct patient in the Worklist** (a new patient can be created if necessary), and click the **Start Exam** button in the Worklist window, to display the Viewer window and permit exposures.
- When ready for the exam, check the image information displayed on the X-ray Console. It should include:
 - The Support Arm angle, if other than 0°.
 - The magnification factor (e.g., M 1.5), if magnification is used.
- Select the breast laterality (right or left). The Console should now show:
 - Laterality (R or L).
 - View name (e.g., LCC, RML, LLM, etc.).
- Check the displayed view name. For special views or recumbent patients, modify the view name manually:
 - *Special Views for standing or sitting patients.* Refer to Chapter 4 [X-ray Console](#), section 4-4 [Manual view name selection \(standing or sitting patients\) on page 41](#).
 - *View names for recumbent patients.* Refer to Chapter 4 [X-ray Console](#), section 4-5 [View names for recumbent patients on page 41](#).

Note:

When the patient is positioned for a Cleavage view (CV), external markers must be used to assist in determining laterality when viewing the image. Place a Right (R) or Left (L) marker in the lateral aspect of the breast of interest, or place markers on the lateral side of each breast. Markers must be placed outside of the 140 mm x 160 mm ROI used by AOP.

- To display the acquired images on the AWS monitor in the same order as films hung in the conventional order on a viewbox, it is suggested that patient images should be acquired in the following order:
 - RCC
 - LCC
 - RMLO
 - LMLO.
- When all parameters are correctly chosen and the patient prepared, make the exposure in the usual way using the *Prep* and *Exposure* buttons.
- After the exposure, the image acquired by the Digital Detector is automatically transferred to the workstation, added to the exam and displayed on the Viewer screen as a raw image. During the transfer of the raw image all user interface functions are disabled.
- If the FineView feature is enabled, the sharpness of the image is optimized by the use of detector feedback information. To enable or disable FineView, refer to Chapter 8 *Browser*, section 8-3 *Medical Application preferences on page 75*.
- Processing of the image is started automatically. See below for a discussion of processing considerations.
- The processed image replaces the raw image within a few seconds; it is displayed with the *Standard* contrast level, unless the *User* level has been selected in Medical preferences. The user can choose a higher or lower contrast level using the View Control contrast setting (see Chapter 11 *Viewer*).
- As soon as an image has been transferred and displayed on the screen, the system is ready for the next exposure. The images (first raw, then processed) from the new exposure replace the previous image in the Viewer.

10 Check View Names

The user can check the image for correct view name and laterality, and change them if necessary. Refer to Chapter 11 *Viewer*, section *3-5 change view name on page 112*.

11 Quality Check (With or Without RRA)

The operator must examine each image and determine if its quality is satisfactory and qualify it, if necessary, using the Quality Check feature. This may be done with the Repeat and Reject Analysis (RRA) function either enabled or disabled.

Refer to:

- Chapter 8 *Browser*, section *8-3 Medical Application preferences on page 75*, subheading *Quality Check on page 77*, that explains the aim of this feature.
- Chapter 11 *Viewer*, section *4-5 Quality Check on page 116*, that explains how to use this feature.

12 Processing

Images received from the Digital Detector are displayed on the LCD monitor as *raw* images immediately after acquisition. Raw images are low contrast. After acquisition, a number of calculations are applied to the image to create the *processed* image, which replaces the raw image on the screen.

Note that both processed and raw images are saved. The raw images are saved in the DICOM MG "for processing" format so that processing can be carried out later if required, perhaps using a hospital-specific algorithm. The processed images are saved in the DICOM MG "for presentation" format, ready for review.

The main calculations that can be applied to create the processed image are:

- Collimator Detection. This applies a black mask around the useful image area, covering areas which would otherwise be white. It allows more comfortable viewing.
- Pseudo-log Transformation. This facilitates the manipulation of brightness and contrast during the review. After the transformation the image dynamic range is reduced to 12 bits, without loss of clinical information.
- Depending on user choice in medical preferences (see Chapter 8 *Browser*, section *8-3 Medical Application preferences on page 75*), either Thickness Equalization or Premium View will be applied:
 - Thickness Equalization. Subcutaneous tissues can be difficult to see on the screen because of monitor display limitations. This is corrected by applying a Thickness Equalization algorithm to decrease the image dynamic range. Image information beyond a threshold level of gray, selected to correspond to subcutaneous tissues, is modified for more visibility. The end result is clear visibility of the medical information in all regions of the breast. When this algorithm is used, the processing description applied is referred to as Proc 1.

The Thickness Equalization algorithm is not applied to the following images:

- Magnified, Spot and Collimated views.
- Images in which the breast tissue covers 100% of the digital detector panel area.
- Images with certain combinations of manually selected parameters.

The processing description applied to these images, when the Thickness Equalization algorithm is not used, is referred to as Proc 0.

- Premium View. This is an image processing algorithm which increases the visibility of breast structures. The main advantage is to provide a single breast image, where the contrast in the fatty tissues is similar to the one obtained by setting WW (window width) and WL (window level) for optimum visualization of fatty tissues, and the contrast in the fibro-glandular tissue is similar to the one obtained by setting WW and WL for optimal visualization of fibro-glandular tissues. Premium View algorithm also includes a Thickness Equalization algorithm to enhance the visibility of sub-cutaneous tissues.

Under certain specific conditions (e.g. particular exposure techniques) the Premium View algorithm cannot be applied.

Note:

Premium View is an image processing algorithm optimized for the structure of breast images.

- **When imaging an object with thick or sharp borders (e.g., a phantom), one might see an enhanced brightness at the border of the object. This enhancement is normal and is not expected to affect correct phantom scoring.**

Note:

When acquiring images with Spot paddle in Mag mode or in Contact mode, the Premium View algorithm output may not be optimal. In this case, a satisfactory image display may be obtained by adjusting window level and window width.

- Auto-contrast. This improves image quality by optimizing the levels of brightness (window level) and contrast (window width) in the image.
- As soon as the selected algorithm has been applied, the processed image replaces the raw image on the screen. The operator can select which of four levels of contrast should be applied (*High*, *Low*, *Standard*, or *User* defined, selected in the Viewer Control Panel window). For Premium View, there is no predefined user value, but *User* level can be set if the user saves the image with modified levels.

Chapter 13 Printing

1 Printing conditions

1-1 Potential printers

Any GE Healthcare-recommended, high resolution, DICOM, printer can be connected to the Senographe DS for printing hard copies of digital images. For compatible printers, see the latest product data sheets for this system, which you can obtain from your local sales Representative.

1-2 Film sizes

- Images (19 x 23 cm) can be printed to both 8 x 10 and 10 x 12 inch film.

CAUTION

Only films formatted to print a single mammogram per sheet of film may be used for diagnostic purposes, and only images printed to 8 x 10 inch film have been validated for diagnostic purposes. Do NOT use films formatted to print multiple images per sheet of film for diagnostic purposes.

1-3 Types of images which may be printed

Only processed images can be sent for printing by the Senographe DS, and only one image per film is available unless Scrapbook is configured and used.

1-4 Information which is not printed

Modifications made to the image (other than window width and window level) are not printed.

1-5 Printing scale

CAUTION

The size of the printed mammogram depends on the type of Workstation used to send the image to the printer, and which printing method is used to print the film. Use the following table for guidance.

Clinical studies validating full-field digital mammography performance have only been carried out using the size designated as "Reference" in the following table.

Relative Sizes of Printed Mammograms From Review and Acquisition Workstations

Workstation	Printing Method	Linear Size Comparison
RWS or Seno Advantage	Print Original Image	Reference
RWS or Seno Advantage	Print Screen	3% reduction
AWS Print Models 1, 2, and 3.	Automatic or Manual Print	The reduction in size depends upon the make and model of printer, and the Print Model in use. Refer to the following table.

Worksta- tion	Print Model	Film size	AGFA	FUJI	KODAK	KONICA
			DryStar 4500M, 5500, 5503	DryPix 4000, 5000, 7000	DryView 8900	DryPro 793
AWS	Model 1	8x10"	0.2%	4.0%	3.3%	3.5%
		10x12"	3.7%	3.7%	2.4%	3.9%
	Model 2	8x10"	0.2%	4.0%	3.3%	3.5%
		10x12"	3.9%	3.7%	2.4%	3.9%
	Model 3	8x10"	4.1%	3.3%	1.3%	1.8%
		10x12"	9.1%	7.6%	8.1%	9.1%

1-6 Printing process

Printing is very simple. You can use the Auto Print function for automatic printing of newly acquired images on the closure of an exam, or manual printing to print individual images from the Viewer window.

2 Printer management

Printers are set up and declared to the system at the time of installation by the GE Field Engineer; printer information cannot be changed by the user.

The access to this function is from the Tools menu 

3 Print functions

3-1 Auto Print

Auto Print is a function allowing the user to automatically initiate the printing of exam images on closure of the exam from the AWS.

Images with a Quality Check value of *OK* are automatically printed by the Auto Print function.

If RRA is installed and enabled, the printing of images with a Quality Check value of *NOT OK* depends on Quality Check settings in Medical Application preferences (see Chapter [8 Browser](#), section [8-3 Medical Application preferences on page 75](#), subheading [Quality Check](#)).

If RRA is not installed or disabled, images with a Quality Check value of *NOT OK* are not automatically printed at the close of the exam.

To use Auto Print, open the **Tools** menu from the Browser (see Chapter [8 Browser](#)), and select **Medical Application preferences**. Click on **Auto Print** in the Medical Application preferences window to access the Auto Print setup tool.

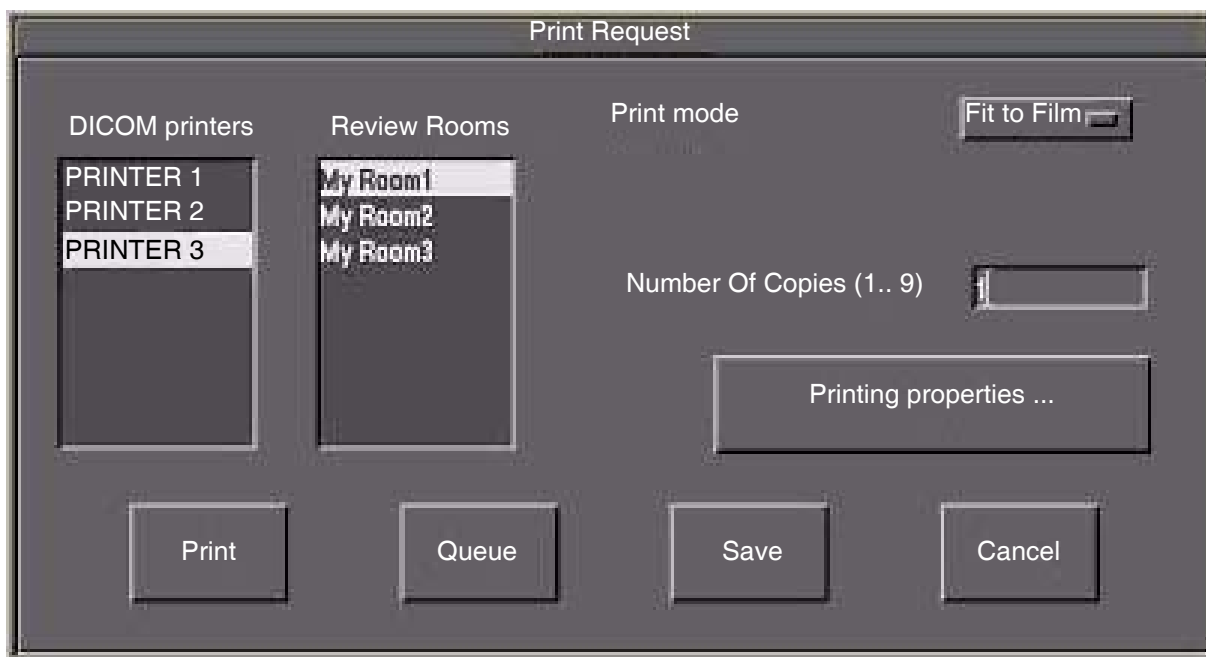
Facilities available from the Auto Print window are:

- *DICOM printers*: contains the list of all the available DICOM printers that have been declared for printing. Click on a printer in the list to select it.
- *Review Rooms*: contains the list of all environmental conditions of available review rooms. Select the room corresponding to the printer. Refer to your field engineer or printer manufacturer for review room configuration.
- *Auto Print buttons*: click the **On** button to turn Auto Print on for the selected printer or the **Off** button to turn it off. The selected button becomes dark gray.
- *Save button*: click this button to confirm any changes made and close the window.
- *Close button*: click this button to close the Medical Application preferences window. If the user has made changes to the *Auto Print* window, a Warning window opens requesting the user to use one of the following:
 - *Save button* (to save the changes and return to the Browser).
 - *Cancel button* (to cancel changes made, close the Warning window and return to the *Auto Print* window).
 - *Discard button* (to close without saving the changes and return to the Browser).
- *Print mode*: only *Fit to Film*. Can not be changed by the user in current Senographe DS release.
- *Number of Copies box*: enter the required number of copies in this box.
- *Printer properties button*: click this button to open the *Printer properties* window (see section [3-3 Printer properties on page 141](#)).

3-2 Manual Print

In addition to the Auto Print function, an image displayed on the Viewer screen can be printed at any time under manual control.

Click the Print button  in the Viewer Function panel to open the *Print Request* window.



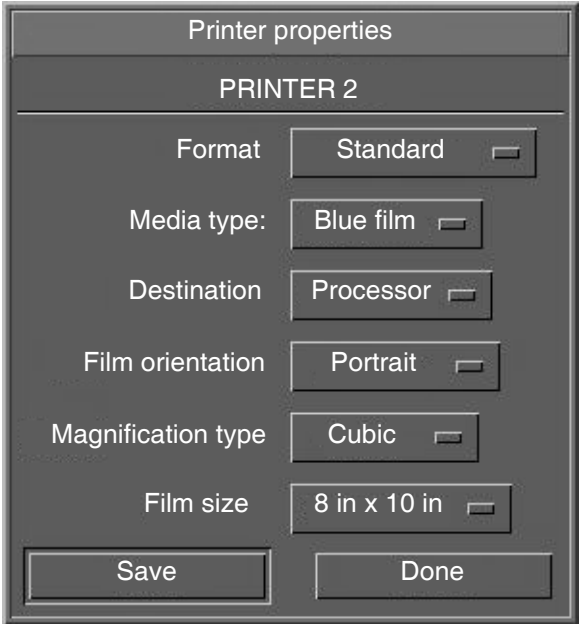
Facilities available from the Print Request window are:

- *DICOM printers*: contains the list of all the available DICOM printers that have been declared for printing. Click on a printer in the list to select it.
- *Review Rooms*: contains the list of all environmental conditions of available review rooms. Select the room corresponding to the printer. Refer to your field engineer or printer manufacturer for review room configuration.
- *Print mode*: can not be changed. Fit to Film only.
- *Number of Copies box*: enter the required number of copies in this box.
- *Printing properties ... button*: click this button to open the Printing Properties window (see section [3-3 Printer properties on page 141](#)).
- *Print button*: click this button to print the displayed image on the currently selected printer.
- *Queue button*: click this button to open the Filming Queue window (see section [3-5 Filming queue on page 142](#)).
- *Save button*: click this button to confirm any changes made and close the window.
- *Cancel button*: click this button to cancel any changes made and close the window.

3-3 Printer properties

This window is accessed from either the Auto Print window, the Print Request window, or the Scrapbook Print Manager panel. It displays the properties set for the selected printer.

- *Format* and *Magnification type* cannot be changed with the current Senographe DS release software.
- *Media type*: *Blue film* must be selected by default with Senographe DS. Other choices will cause printing errors.
- *Destination*: *Processor* must be selected by default when using Senographe DS. Other choices will incur printing errors.
- *Film orientation*: *Portrait* must be selected by default when using Senographe DS. Other choices will incur printing errors.
- *Film size* can be toggled between 8 in x 10 in and 10 in x 12 in.



3-4 Printing status

The Printing status window displays the status of the requested printing jobs.

- If a job shows the *OK* comment, the exam has successfully been sent to printing. If the job shows the *ABORTED* comment, the job has been aborted manually by the user from the menu window buttons.
- Click the **Queue** button to open the Filming Queue window (see section [3-5 Filming queue on page 142](#)).



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NOTE: Once downloaded, this document is UNCONTROLLED, and therefore may not be the latest revision. Always confirm revision status against a validated source (ie CDL).

3-5 Filming queue

This window is accessed by clicking the **Queue** button in the Print Request window or the Printing status window. It displays a list of jobs in the print queue, allowing the user to check that print jobs have been successfully sent to the printer (note that a local printer problem can prevent a job from being printed, even if it is successfully sent to the printer). If any communication problems are observed with the printer or network, the user is able to *Refresh*, *Pause*, *Resume*, or *Clear* jobs listed in the Queue.



3-6 Print annotation models

When printing images to film, three models of annotation layout are available. They differ in the position and type of annotation information to be printed.

Note:

Only the annotation model shown below as Model 3 contains the information required by the Quality Mammography Standards of the MQSA.

Select the model to be used in the *Medical Application preferences Annotations* panel (see Chapter 8 [Browser](#)).

The illustrations below show the three models. In each case the model is illustrated by a view with the chest wall to the right.

3-6-1 FB view exception

On the AWS, the View and laterality indication is placed in the lower part of the monitor.

Most images of the breast are presented with the axillary region in the upper part of the monitor. The **FB** (From Below) views are presented in deviation to this practice and have the axillary region in the lower part of the monitor.

As a result of a software enhancement that provides consistency among all views in images printed to film, the axillary region of FB views is now placed near the upper part of the film. To indicate that an FB view film printout has the benefit of this enhancement, its laterality annotation (*L* or *R*) is printed in *italics*. For detailed information about FB view exception, see Chapter 11 [Viewer](#), [1-1-1 FB view exception on page 100](#).

Print annotation Model 1:

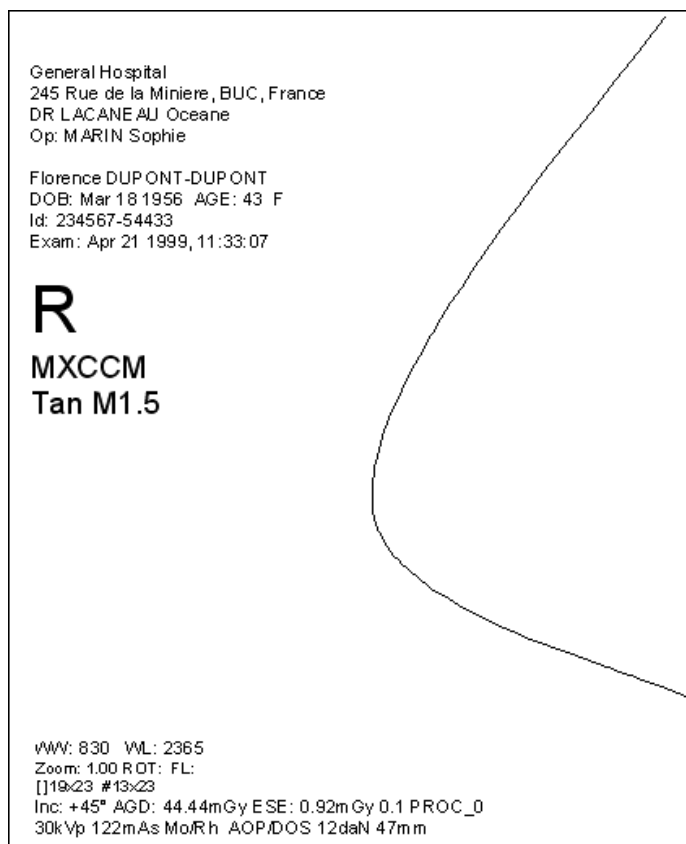
Model 1:

Institution, physician, operator, and patient data at top, followed by view data.

Image and exposure data at bottom.

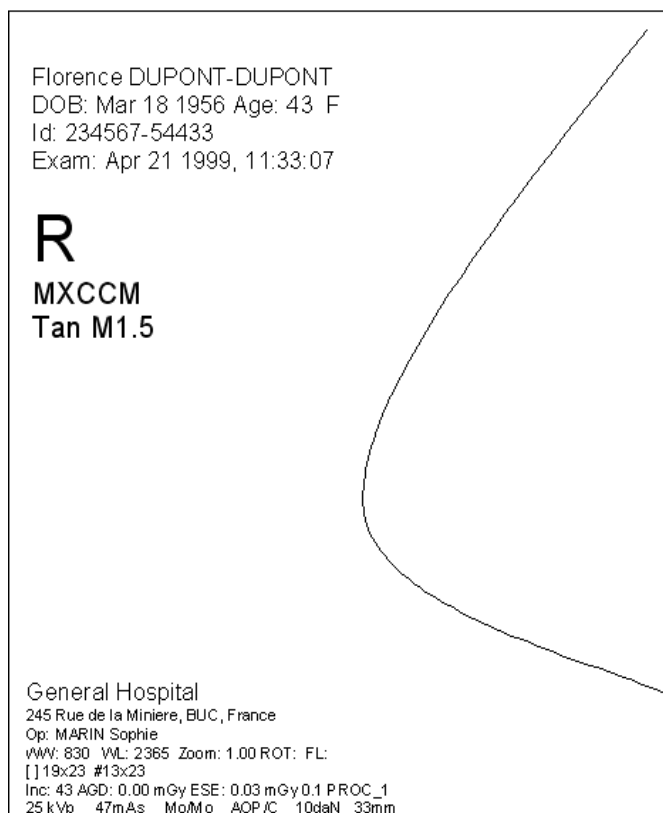
Top and bottom annotation areas are aligned to the border opposite the chest wall.

This model does NOT contain all of the information required by the Mammography Quality Standards Act (MQSA).



Printing

Print annotation Model 2:

*Model 2:**Patient data at top, followed by view data.**Institution, image and exposure data at bottom.**Top and bottom annotation areas are aligned to the border opposite the chest wall.**This model does NOT contain all of the information required by the Mammography Quality Standards Act (MQSA).*

Print annotation Model 3:

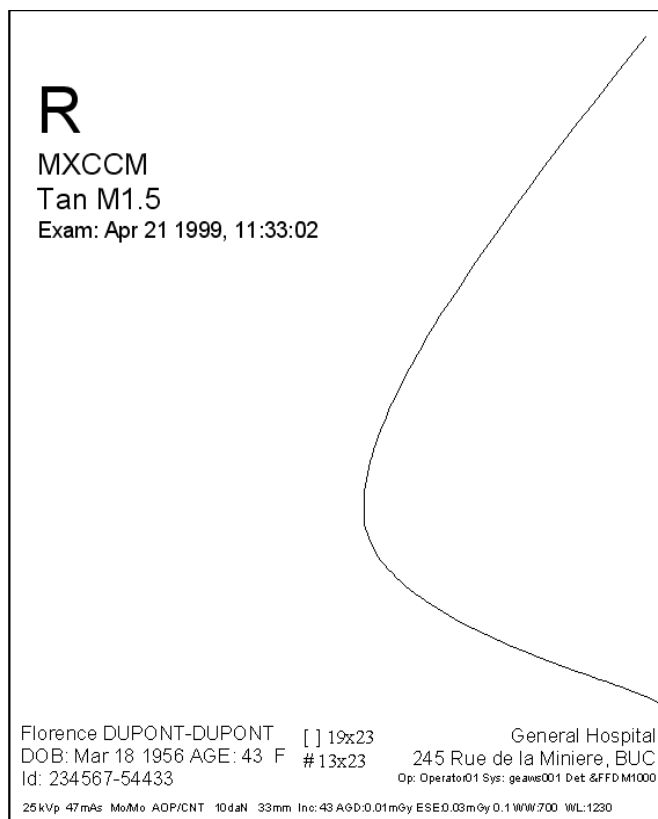
Model 3:

View data at top, followed by exposure date and time.

Patient data at bottom left, institution and operator data at bottom right, followed by exposure data.

The top annotation area is aligned to the border opposite the chest wall. All bottom annotations are restricted to the image footer so as to avoid overlap with the image.

This model contains the information required by the Mammography Quality Standards Act (MQSA).



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Chapter 14 Interchange Media

1 Overview

The Interchange Media option provides a compact disk recording (CD-R) drive, installed inside the Control Station (see illustrations below).

Illustration 1 Access to CD Drives FOR earlier systems



- Access to optional CD reader/recorder drive
- For Interchange Media usage by the operator
- Referred to as CD-R or CDR elsewhere in this manual

- Access to CD reader drive
- For service only

Illustration 2 Access to CD Drive FOR more recent systems



- Access to CD reader/recorder drive
- For Interchange Media usage by the operator
- Referred to as CD-R or CDR elsewhere in this manual
- Also used by service.

The Interchange Media option allows you to save and restore Senographe DS image data using standard or mini recordable compact disks (DICOM data format). Images saved in this way may, for example, be passed to another radiologist for a second opinion.



The Interchange Media option is NOT recommended for permanent archiving. GE does not guarantee the suitability of the media for such purposes.

Interchange Media

The presence of the CD-R option is indicated by an icon in the Network panel of the Browser window (upper left corner).



- An icon appears below each of the lists in the Browser window. These icons may be turned off and on in the Browser preferences window, accessed through the Tools menu, see Chapter 8 [Browser](#).



2 Using the Interchange Media option

Recordable CDs are considerably more sensitive to damage than the conventional CD-ROMs that you may be familiar with. Respect the handling instructions below.

2-1 Handling CD-R media

Notice:

To avoid image loss, never touch the recordable surface of a recordable CD (CD-R). Handle the disk only by the outer edge. Do not place it face down on a hard surface. Fingerprints or scratches will make the disk unusable.

Before usage, verify that the CD-R surface has no visible scratches. If there are any scratches, do NOT use the CD-R.

- Store the disk in its protective case. Proper storage helps protect the data from damage due to scratches on the disk surface.
- Do not leave the disk in direct sunlight or in a hot, humid environment. These conditions can warp and damage the disk.
- Use only a felt tip permanent pen when labeling. Write only on the printed area or on the clear inner diameter of the disk. Never use a ballpoint or hard point writing tool as it may damage the disk. Do not use adhesive labels.
- Use a soft, lint-free cloth to remove spots, dust, or fingerprints from the disk. Always wipe from the center to the outside edge of the disk. Never wipe the disk in a circular motion.
- Do not use any chemical-based cleaners. These can damage the disk.

2-2 Saving images on recordable CD

Note:

We recommend the use of Senographe DS-compatible CD-R media that have been officially validated for performance and reliability of patient data interchange on the Senographe DS system. These are identified by GE labelling. GE cannot take responsibility for any data loss or incompatibility with other systems resulting from the use of media not supported by Senographe DS.

To order Senographe DS-compatible media, contact your local sales representative.

A recordable CD (CD-R) can only be recorded once.

When saving image data on a CD-R, you must always use a BLANK CD-R.

2-2-1 Procedure

All image data that you want to save on a given CD-R must be selected beforehand, and will be saved in a single pass. It is not possible to add data on a CD-R.

- Push the eject button under the tray on the CD-R drive. When the tray opens insert a new (blank) recordable CD into the CD-R drive (see section [2-1 Handling CD-R media on page 148](#) on how to handle recordable CDs) and close the drive by pushing the button again. Wait for 40 seconds for the CD-R drive to be ready (when the light on CD-R drive stops blinking).
- On the Browser, select the patient or patients to be saved in the same manner as selecting images for review (click on the required patient name in the Browser list; to select multiple patients, hold down the <Ctrl> key and click successively on each required patient name).
- Use the middle mouse button to drag the selected patient(s) to the CD-R icon in the Network panel

OR:

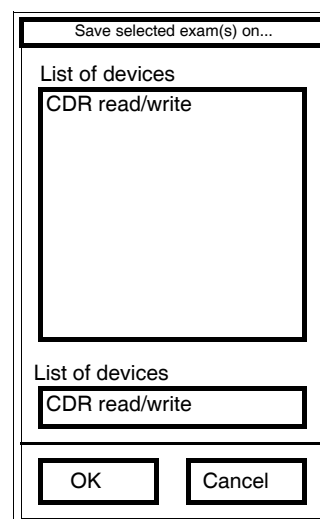
Click on the **Push** button below the patient list on the Browser (if the icon is not present, it may be turned on by accessing Browser preferences from the Tools menu). A window opens to show a list of available recording devices.



Select the CD-R read/write device by clicking on its name in the displayed list, then click on **OK**. If the Preview of CD-R content option has been set (see below) a list of data to be recorded on the CD-R is displayed.

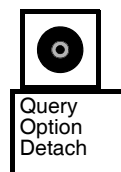
After about 15 minutes a message is displayed, indicating how much of the CD-R capacity will be used.

Click on **Write** to start the operation, or on **Cancel** to cancel it.



Note:

While selecting items (before you start the save), the operation can be abandoned by clicking on the CD-R icon and selecting *Detach* in the drop-down menu. This stops the operation. The CD is ejected automatically and can be used again.

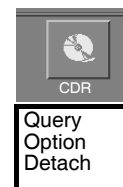


2-2-2 Preview option

After clicking on the *OK* button or after using "drag-and-drop" to start recording, but *before* saving starts, the Preview of CD-R content option automatically displays a list of the patients which will fit on the CD-R, and the estimated time required. Note that the list may not be in the order selected by the user, and that it cannot be assumed that all patients selected for recording will fit.

At this stage, you can still cancel the save operation and modify your selection if required.

- To set this option on or off, click the *CD-R* icon in the Network/Archive panel on the main Browser and select *Option* in the drop-down menu.



2-2-3 Checking the CD-R

You are recommended to check for successful completion by browsing the CD-R at the end of the save operation.

- To do so, click the **CD-R** icon on the main Browser, then select *Query* in the drop-down menu. If all the patients selected for the save operation are not displayed on the *Media Browser* an error has occurred while recording the CD, and you will have to repeat the save operation.
- An error message appears next to the patient name if the associated information has not been saved. If this occurs:
 - Make a list of the patients correctly saved and those with an error.
 - Insert a new CD-R and repeat the save process.
 - If there are still errors, consult GE Service.

2-2-4 System not available while writing to CD-R

No other operation can be performed on the system while saving images on a CD-R. For a full CD-R the save operation can take up to 25 minutes.

2-2-5 Errors

If a problem occurs, an error message is displayed:

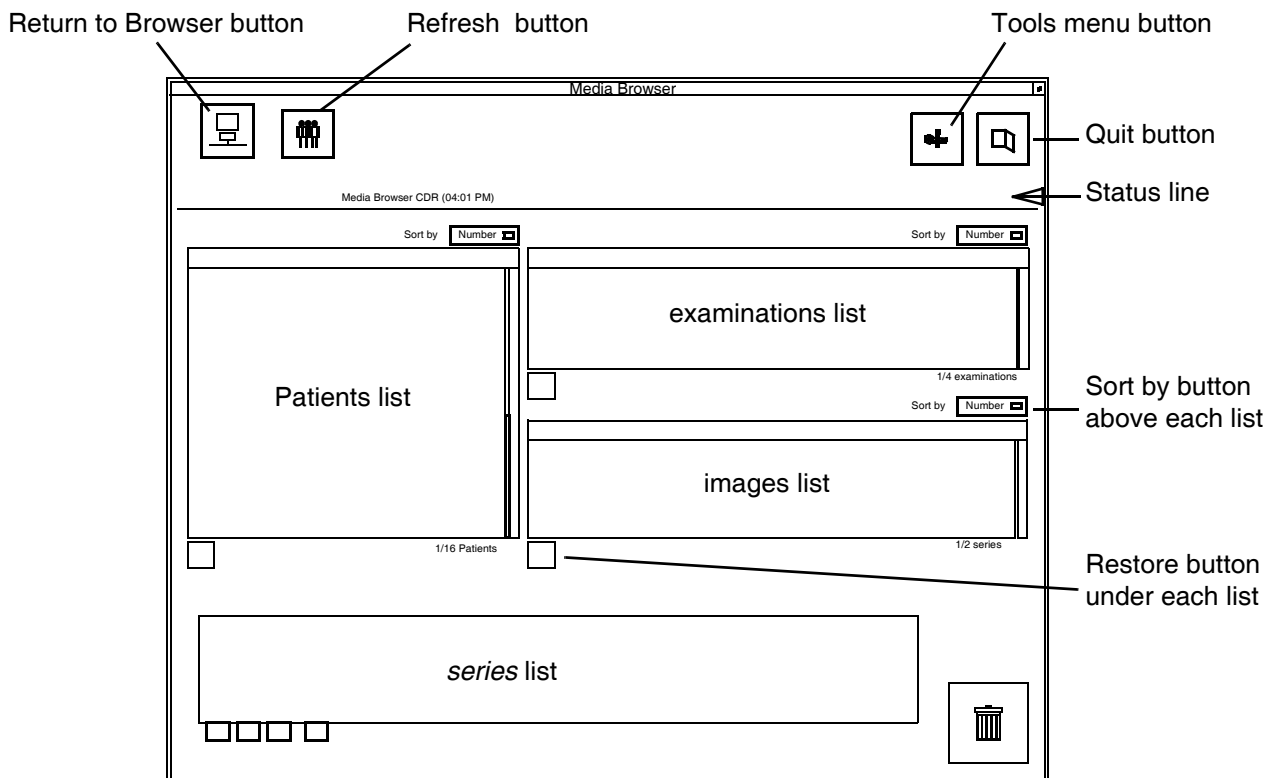
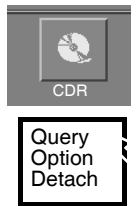
- The following message may be displayed during preparation for saving files; it needs specific action:
Save selection exceeds CD capacity. Save aborted.
Explanation: You have selected more patient files than can be stored on a single CD.
Action: Select fewer patients or fewer exams to be saved on the CD.
- If a problem occurs during the save process, the error message *Save failed* is displayed.
 First check that the CD-R drive is switched on, the blank recordable CD is correctly inserted in the CD-R tray, and the tray is fully closed.
 If the items above are correct, an error has occurred while recording the CD, and you will have to repeat the save operation using a new blank CD.

2-3 Restoring images from recordable CD

You can restore and review Senographe DS images from recordable CDs that were recorded either on the same or on another Senographe system.

2-3-1 Procedure

- Check that there is enough space on your image disk to accommodate the images being restored (refer to the used disk space display on the main Browser).
- Insert the CD containing the images into the CD-R drive (see section [2-1 Handling CD-R media on page 148](#) for handling precautions).
- Click on the *CD-R* icon in the Network panel on the main Browser and select **Query** in the drop-down menu to open the Media Browser.



- In the Media Browser, select the patient(s) and/or exam(s) to be restored in the same manner as on the main Browser (see Chapter [8 Browser](#)).
- Sort the lists as required using the *Sort by* buttons.

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- After selecting the desired patient, exam, series or image item(s):
With the cursor on the selection, press and hold the *middle* mouse button and drag the selection directly onto the **Return to Browser** button at top left.

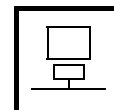
OR

Click on the corresponding **Restore** button (if the icon is not present, it may be turned on by accessing Browser preferences from the Tools menu).



The selected items are copied from the CD-R to the workstation database.

- Click on the **Return to Browser** button to return to the main Browser.
- See section [2-4 Ejecting a disk from the CD-R drive on page 153](#) on how to eject the CD from the CD-R drive after the restore operation.

**Note:**

During the restore, no other operations are possible on the Workstation.

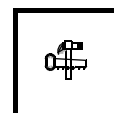
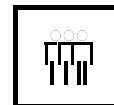
When a patient name already exists in the Workstation database, any exams being restored from the CD for that patient are appended to the existing exams.

2-3-2 Errors

- When restoring files, the operation is halted if there is not enough space on the Workstation disk to restore the selected items (patients or exams).
You can repeat the operation after freeing Workstation disk space by deleting some patients that have already been saved.

2-3-3 Notes

- The contents of the Media Browser are up-to-date when the Media Browser is first opened. However, changes (such as after a save operation) are not displayed automatically. Click on the **List of registered DICOM printers** button to update the Browser lists. The time of the latest refresh is displayed on the status line.
- The Media Browser Tools menu contains the Application Management menu item. This item is for use of GE Service only.
- The Main Browser and Media Browser display the same columns of information in the Patients, examinations, series and images lists. However, some of these columns may be empty in the Media Browser. The full information will be displayed in the Main Browser after the images have been restored.

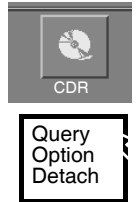


2-4 Ejecting a disk from the CD-R drive

As soon as the CD-R drive has been accessed for a save or restore operation, it is locked, and you can no longer eject the disk by means of the eject button on the front of the drive.

You must first perform a *Detach* operation:

- Click on the storage device icon in the Main Browser and select **Detach** in the drop-down menu.
- If the disk is not ejected automatically, press the eject button.
- If *Detach* is displayed in grey and no save or restore operation is in progress, the archive device is already unlocked. Press the eject button to open the drive.



If a fault occurs (for example trying to start a restore operation with a blank disk in the drive), the *Detach* operation is performed automatically, and the disk is ejected.



Notice:

NEVER press the eject button on the CD-R drive while a save or restore operation is in progress.

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Chapter 15 Maintenance

1 Cleaning and disinfection

1-1 Monitor cleaning instructions

It is important that monitors used for viewing mammographic images be kept clean and free of fingerprints, dust, etc.

These instructions are applicable to LCD and CRT monitors.

Use a microfiber cloth to clean the monitor screen and housing. If necessary, moisten the cloth with either clean water or ethyl alcohol (up to 96%). Do not allow any drops of cleaning liquid to remain on the surface; extended contact may cause discoloration of the surface.

! Notice:

Do not use isopropyl ("rubbing") alcohol.

Do not use cleaning agents which attack the surface, such as petroleum (mineral) spirits.

The front panel is extremely sensitive to mechanical damage. Avoid all scratches, knocks, etc.

Do not apply the cleaning liquid directly to the monitor housing or screen.

Do not allow the cleaning liquid to enter the monitor housing; be sure to dampen the cloth sparingly.

1-2 General information about disinfection

CAUTION

Adequate cleaning and disinfection is necessary to prevent disease transmission. Be sure to thoroughly clean and disinfect equipment surfaces that contact the patient and all equipment surfaces likely to become soiled during use.

The level of disinfection required for a patient contact device depends on the type of contact that occurs:

- A **CRITICAL** device is one which routinely penetrates the skin or mucous membranes during use and therefore poses a high risk of infection if it is not sterile. Such devices (e.g., surgical instruments, needles, catheters or infusion sets) must be made **sterile** prior to use.
- A **SEMI-CRITICAL** device is one which contacts mucous membranes but does not penetrate normally sterile areas of the body. Such devices (e.g., endoscopes, speculum) should be made sterile whenever practical, but **high level disinfection** is usually acceptable prior to use.
- A **NON-CRITICAL** device is one which contacts intact skin during routine use. Such devices (e.g., patient exam tables, blood pressure cuff, etc.) present a much lower risk of infection and, therefore, a **low level disinfection** is usually acceptable. However, in cases when there is concern for cross contamination, an **intermediate level disinfection** should be done between patients.

The patient contact surfaces of mammography equipment are noncritical, and either low level or intermediate level disinfection is adequate for routine use. These surfaces are the Bucky/Image Receptor, compression paddles and magnification stands. Other surfaces, such as the face shield, which may have casual contact with the patient should be considered for intermediate level disinfection.



Improper cleaning methods or the use of certain cleaning and disinfecting agents can damage the equipment, cause poor imaging performance or increase the risk of electric shock.

To avoid possible injury or equipment damage:

- Unless specified otherwise, do not use harsh detergents, abrasive cleaners, high alcohol concentration or Methanol at any concentration. If skin preparations contain high alcohol concentrations, allow sufficient drying time before applying compression.
- Do not expose equipment parts to steam or high temperature sterilization.
- Never allow liquids to enter the internal parts of the equipment. Do not apply cleaning sprays or liquids directly to the equipment; always use a clean cloth dampened with the spray or liquid. If you become aware of liquid entry, disconnect the electrical supply and have the equipment checked by qualified service personnel before returning it to use.

1-3 Patient contact surface cleaning instructions

Patient contact surfaces should be washed with mild soap in lukewarm water. Removable parts that do not contain electrical components, such as the compression paddles, may be removed from the equipment and immersed if needed. Equipment parts such as the Bucky/Image Receptor that enclose electrical components must not be immersed but rather cleaned with a soft dampened cloth, taking care not to allow liquids to enter the equipment. Surfaces should be scrubbed as needed using a soft sponge, gauze or cloth to remove all visible residue. Scrubbing with a soft bristle brush (such as a toothbrush) may be necessary to reach corners or to remove material that has dried onto the surface. Subsequent disinfection may not be effective if the surfaces are not thoroughly clean.

Rinse all surfaces with clean water to remove visible soap residue, taking care to avoid liquid entry to internal equipment parts. Dry surfaces with a soft cloth to remove any visible residue.

1-4 Low level or intermediate level disinfection

Patient contact surfaces may be disinfected with a suitable liquid chemical germicide. Surfaces must first be cleaned of all visible contamination (see above). The liquid germicide must have a minimum contact time with the surface to be effective. Equipment parts should be wiped with a wet cloth or sponge as directed by the instructions for use provided with the germicide. If needed, removable parts not containing electrical components (compression paddles and magnification stands) can be removed and immersed. Further rinsing or wiping with clear water and drying with a soft cloth should be done to remove any germicide residue that may remain. Take care to avoid liquid entry to internal equipment parts.

1-5 High level disinfection

In the event that you feel a high level disinfection is necessary due to equipment contact with broken skin, or being used with infected or immune compromised patients, the same patient contact surfaces may be high level disinfected with a liquid chemical germicide rated for high level disinfection. The same process used as that for intermediate level disinfection is generally followed; however, the time of contact is usually much longer for high level disinfection.

1-6 Recommended germicides

The following legally marked products have been used on GE equipment without causing equipment damage.



Always follow the germicide manufacturer's instructions and precautions for mixing, storage, method of application, contact time, rinsing requirements, protective clothing, shelf life and disposal to help assure effective and safe use of the product.

1-6-1 Low or intermediate disinfection

VESPHENE IIse, manufactured by Calgon Vestal Laboratories, St. Louis, MO, U.S.A., EPA Reg. No. 1043-87 (510(k) K931573)

According to the manufacturer, when used according to the manufacturers instructions, this product is effective against:

- Acinetobacter calcoaceticus, ATCC 19606
- Candida albicans, clinical isolate
- Candida parapsilosis, clinical isolate
- Citrobacter freundii, ATCC 8090
- Enterobacter aerogenes, ATCC 13048
- Enterobacter cloacae, ATCC 23355
- Escherichia coli, ATCC 25922
- Klebsiella pneumoniae, ATCC 13883
- Proteus mirabilis, clinical isolate
- Proteus vulgaris, ATCC 13315
- Pseudomonas aeruginosa, ATCC 15442
- Pseudomonas aeruginosa, ATCC 27853
- Salmonella choleraesuis, ATCC 10708
- Salmonella typhi, ATCC 6539
- Salmonella typhimurium, ATCC 14028
- Serratia marcescens, ATCC 8100
- Shigella flexneri, ATCC 12022
- Shigella sonnei, ATCC 25931
- Staphylococcus aureus, ATC 6538
- Staphylococcus aureus, ATCC 25923
- Staphylococcus aureus (MRSA), Multiply Methicillin resistant clinical isolate
- Staphylococcus epidermidis, ATCC 12228
- Streptococcus faecalis, ATCC 19433
- Streptococcus pyogenes, ATCC 19615
- Trichophyton mentagrophytes
- Mycobacterium tuberculosis var. bovis
- Influenza A₂ Japan
- Herpes simplex type 2
- Vaccinia

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- Adenovirus type 2
- HIV-1 (AIDS) virus

LpHse, manufactured by Calgon Vestal Laboratories, St. Louis, MO, U.S.A., EPA Reg. No. 1043-92 (510(k) K931342).

According to the manufacturer, when used according to the manufacturer's instructions, this product is effective against all of the above, with the exception of *Salmonella choleraesuis*.

1-6-2 High level disinfection

CIDEX, manufactured by Johnson & Johnson Medical, Inc., Arlington, TX, U.S.A., EPA Reg. No. 7078-1, EPA Est. No. 36126-PR-1 (510(k) K924434).



CIDEX (a cleaning solution) contains glutaraldehyde. direct contact is corrosive to exposed tissue, causing eye damage and skin irritation/damage. do not get into eyes, on skin or on clothing. use in well ventilated area in closed containers.

2 Planned Maintenance

To ensure safe and effective operation of the equipment, planned maintenance procedures should be carried out at the intervals specified.

2-1 Planned maintenance performed by the Field Service Engineer

Planned Maintenance (PM) shall be performed twice a year by a GEMS Service Representative or similarly qualified and trained personnel.

A complete day is necessary on each occasion. The procedures and their frequency are listed below.

Task Title	Interval (months)
On-site Preliminary:	
Backup Senographe parameters	12
Inspection:	
Preliminary visual inspection of site	6
Visual inspection of equipment	6
Inspect the Radiation Screen	6
Generator/Tube:	
Remove Generator Covers.	6
Clean Conditioner Air Filter	6
Check and top-up Conditioner coolant	12
Replace Conditioner Coolant	12
Check HV Unit	12
Check Half Value Layer (HVL)	12
Check kVp settings	12
Check mA and mAs settings	12
Replace Generator CPU Lithium Battery	36
Reinstall Generator covers.	6
Generator cover check	6
Gantry:	
Check Breast Thickness Measurement	6
Check Gantry functions	12
Check for correct collimation	12
Remove Gantry covers.	12
Check and lubricate Gantry mechanisms	12
Change Gantry CPU Board	120
Reinstall Gantry covers	12

Task Title	Interval (months)
Gantry cover check	6
Check Manual Compression maximum force.	12
Check Gantry emergency stop buttons.	12
Control Station - UPS:	
Check UPS function	6
Recalibrate UPS Battery Capacity	12
Control Station cover check	6
Acquisition Image Quality:	
Image Quality Tools Flat Field Test	6
Calibrate Conversion Factor	6
Check Image Acquisition and ACR Score	6
Calibrate mAs Non-Linearity (Automatic)	6
AOP calibration:	6
AOP mode and SNR check	6

2-2 Planned maintenance performed by the Radiologic Technologist

This consists of simple Quality Control (QC) tests which ensure that the system is operating to its design standards.

Frequency: from daily to semiannually, depending on the task.

Procedures: please refer to the Senographe DS QC manual.

2-3 Planned maintenance performed by the Medical Physicist

This consists of QC tests performed by the Medical Physicist to ensure that the system provides a high level of mammographic quality.

Frequency: annually.

Procedures: please refer to the Senographe DS QC manual.

3 Test for flexible paddle deflection in compression

3-1 Objective

To ensure that the flexible compression paddle is capable of applying effective compression to the breast.

3-2 Frequency

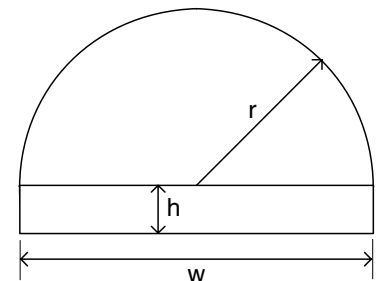
This test should be performed annually or when a loss in performance is suspected.

3-3 Test object

The test object is based on estimates of the average size of a compressed breast.^{1,2} Refer to GE MQSA Compliance Guide 2233373-100 for information on the calculations used to determine its dimensions.

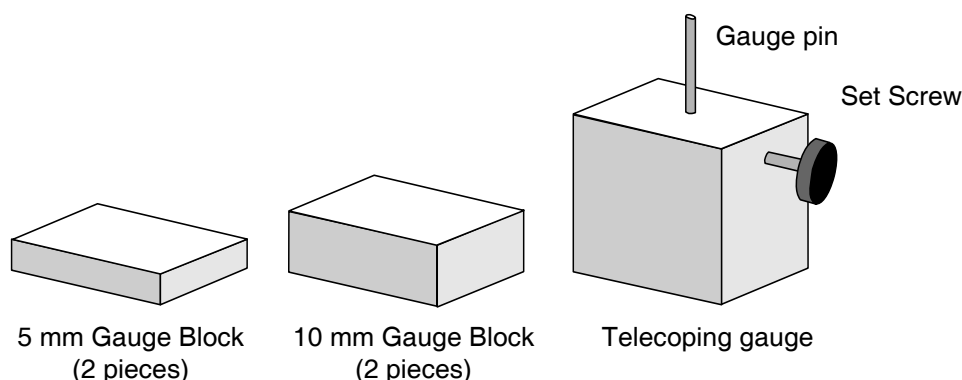
The suggested test object is shown here:

- The basic shape is a right circular semi-cylinder extended by a rectangular box.
- Its dimensions are:
 - $r = 9 \text{ cm}$
 - $h = 1 \text{ cm}$
 - $w = 18 \text{ cm}$
- See below for information on the thickness and suggested material of the test object.
- The thickness of the test object is not critical, but values in the range of 3 to 5 cm are recommended. Since the purpose of the test objects is to evaluate the parallelism between the compression paddle and the breast support surface, the parallelism of the upper and lower surfaces of the test objects is critical. Consistency of the thickness within $\pm 0.5 \text{ mm}$ is recommended.
- It is intended that the test object be made of a compressible, foam material. One foam material that has been used in a similar application is type T-200, Minicel foam produced by the Voltek division of Sekisui America Corporation. This foam has been selected for use in the "Tissue Mimicking Compression Test Tool," Model BC200, sold by Standard Imaging, Middleton, WI, in part because it behaves similarly to breast tissue during compression.³



3-4 Telescoping gauge and gauge blocks

- A telescoping gauge can be used to locate the corner of the compression paddle that most closely approaches the breast support surface after compression is applied to the test object. The telescoping gauge is then stacked on an appropriate thickness of gauge blocks to test the distance between each of the other three corners of the paddle and the support surface and to determine if the deflection of the paddle meets the specification. This gauge kit provides a "go-no go" test of the deflection.
- A minimum of one 10 ± 0.05 mm gauge block is needed to perform the test on a paddle that is intended to remain flat and parallel to the breast support table [21 CFR 900.12(b)(8)(B)]. Additional blocks of appropriate thicknesses (± 0.05 mm) must be included for testing of paddles such as the flexible paddle which are not intended to remain flat and parallel within the 1.0 cm deflection limit [21 CFR 900.12(b)(8)(C)], or to extend the telescoping gauge in the event that the gauge pin does not contact the compression paddle with the pin fully extended from the gauge.



3-5 Support plate

- Another element of the test set up is a support plate. This is based on the observation that the breast support surface as well as the compression paddle will deflect during the compression. The intent is to support the test object on a surface that is considerably more rigid than the compression paddle so that the deflection of the paddle is measured and not the deflection of the base on which it rests. The support plate should be large enough to completely cover the image receptor support device. A sheet of acrylic with dimensions of about 25 cm x 30 cm x 1.9 cm thick (10 in x 12 in x 3/4 in) is suggested. A 10 in x 12 in x 1/4-inch aluminum sheet could also be used for this purpose.

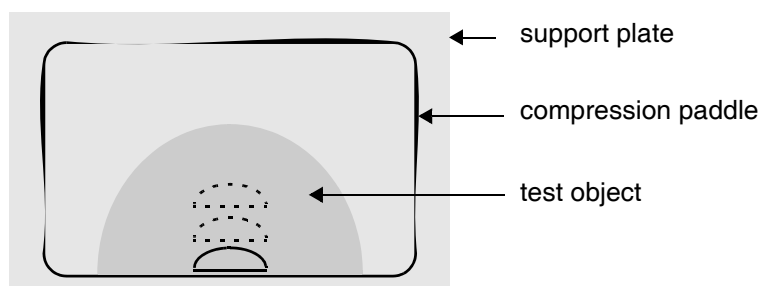
3-6 Procedure

1. Place the support plate directly on the image receptor support device so as to completely cover the breast support surface.

Note:

The support plate must be parallel to the breast support surface of the Bucky. Ensure that the support plate is not resting on any corner reinforcements or other raised edges on the top of the Bucky. If the support plate is placed on top of the force scale, ensure that the top surface of the support plate remains parallel to the breast support surface of the Bucky. The distance between the breast support surface of the Bucky and the top surface of the support plate should be constant within 1 mm around the periphery of the Bucky.

2. Place the test object on the support plate as shown below with the cylindrical axis of the test object aligned along the X-ray beam. Align the straight edge of the test object with the chest wall edge of the compression paddle. Center the test object left-to-right.

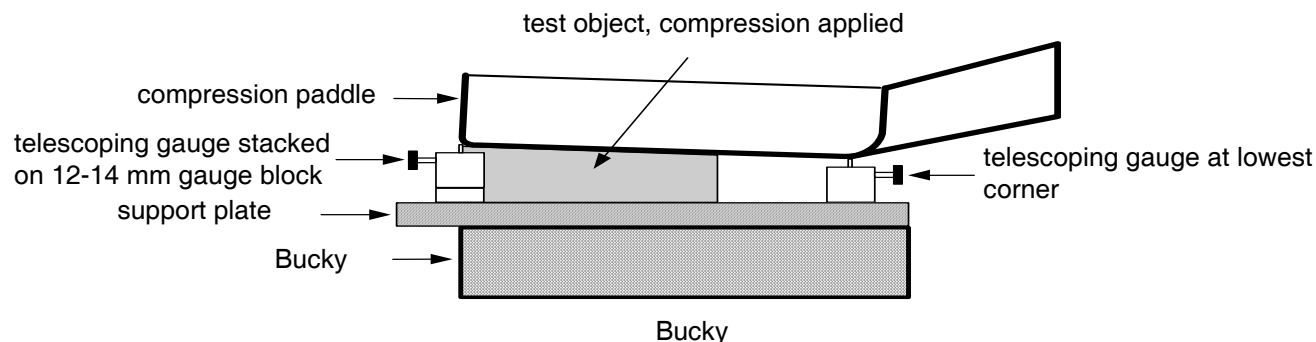


3. Apply a compression force of 11 to 12 daN (25 to 27 lb.).
4. Use the telescoping gauge to locate the lowest corner of the compression paddle (closest to the support plate) as shown in the illustration below. Use the set screw on the telescoping gauge to lock the gauge pin in position at the measured distance.

Note:

If the pin on the telescoping gauge is fully extended yet the gauge is shorter than the smallest distance between the support plate and the compression paddle, use the gauge blocks to extend the reach of the telescoping gauge.

5. Stack the telescoping gauge on a thickness of gauge blocks to test for the 12 mm to 14 mm deflection limit specified for the flexible paddle. Test each corner of the compression paddle to determine if the combination of the telescoping gauge plus the gauge block(s) can fit between the compression paddle and the support plate.



3-7 Evaluation

- For the flexible compression paddle, which is not intended to be flat and parallel to the breast support table during compression, the deflection must be within the following values:
 - Minimum: 12 mm.
 - Maximum: 14 mm.

3-8 Corrective action

- If the deflection exceeds the specified limits, the paddle should be replaced.

3-9 References

1. I. Fife, "The physical dimensions of the compressed breast," *British Jnl. of Radiology*, 64, 73, 1991.
2. *Handbook of Glandular Tissue Doses in Mammography*, HHS Pub. FDA 85-8239, U. S. Department of Health and Human Services, Food and Drug Administration, Rockville, MD, March, 1985.
3. Keith Nelson, Standard Imaging, Middleton, WI, private communication.

Chapter 16 Error messages

1 Error messages

Any operational anomalies found by the system during Senographe DS operation are signalled by *Error Messages*. These may be displayed on the X-ray Console, in a pop-up window on the AWS monitor, or on the Gantry Readout. They may be simple information messages requiring no action, or they may indicate error or fault conditions requiring action from the operator and/or GEMS Service engineers.

If you need to call GEMS Field Service about an error, you should quote the entire message or messages, complete with any identification characters.

The following tables list error messages which may occur, with explanations and recommended actions.

Table 1 - lists error messages displayed on the X-ray Console.

- These messages begin with a three-character identification code, followed by the message itself. The first letter of each code indicates the type of message, as follows:
 - **Exx**: *Error messages* indicating that a non-recoverable error has been detected. The system must be restarted by switching ON/OFF from the X-ray Console.
 - **Ixx**: *Information or warning messages* indicating operational errors due to temporary fault conditions or attempts to use non-permitted configurations. It is usually possible to continue use of the system without reboot.
 - **Sxx**: *System exposure messages* indicating conditions in which an exposure may not be possible or has not been correctly terminated.

Table 2 - lists error messages displayed on the AWS monitor.

- Three main types of messages are displayed on the AWS monitor:
 - Information messages relating to power on/off events.
 - Information messages relating to boot/reset events.
 - Information messages relating to disk or memory problems.

Table 3 - lists error messages displayed on the Gantry Readout.

- Four main types of message are displayed on the Readout panel at the foot of the Gantry:
 - *Information messages* with no prefix: Displayed to acknowledge operator actions such as the selection of a new field of view.
 - *Advisory messages* with a prefix **Axx**: Displayed to warn the operator when a requested operation is not possible.
 - *Halt messages* with a prefix **Hxx**: Displayed to warn the operator that a non-recoverable error has been detected. The system must be restarted by switching ON/OFF from the X-ray Console.
 - *Warning messages* with a prefix **Wxx**: Displayed to warn the operator when an error has been detected that does not prevent continued operation.

Error messages

Table 1 Error Messages displayed on the X-ray Console

Message on X-ray Console	Explanation	Corrective Action
E01 Generator failure	Problem reported in HV section of generator.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service.
E02 Focus bias failure	Problem reported in tube focus bias circuits.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service.
E03 Rotor failure	Problem reported in anode starter.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service.
E04 Arm fatal failure	Generator detects error in dialog with arm.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service.
E05 Failure during exposure	Current exposure aborted due to failure in equipment.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and inform GEMS Field Service.
E06 Software error (gen CPU)	An error occurred in the Generator CPU software.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and inform GEMS Field Service.
E07 Please TURN OFF the console !	A generator emergency failure occurred but a second failure prevented the system from shutting itself down.	1) Note ALL messages. 2) Switch OFF the system from the X-ray console to quickly switch off the generator. 3) Contact GEMS Field Service.
E08 Power supply failure	Supply of generator power circuits is not authorized.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service.
E10 Heating failure track 1	Molybdenum focal track is unserviceable.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service. You can still work with rhodium focal track.
E11 Heating failure track 2	Rhodium focal track is unserviceable.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service. You can still work with molybdenum focal track.
E12 Checksum error (gen)	Calibration parameters have been modified.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service.
E13 Gen./Arm communication fail	Generator cannot communicate with arm.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service.

Message on X-ray Console	Explanation	Corrective Action
E14 Generator CPU/INTG failure	A problem has been reported by the Generator CPU.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service.
E15 Console communication fail	Generator cannot communicate with X-ray Console.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service.
E18 IDC/SENO Synchro. fail	A problem occurred in synchronization between Image Detection Controller system and Generator during acquisition. The image may be fully acquired, but dose parameters will be missed (set to 0 in the image). Next exposure is inhibited.	1. Power OFF/ON from the X-ray Console. 2. If the problem occurs again at the next acquisition, power OFF the whole system and wait for the end of the shutdown sequence. 3. Restart the system. 4. If the problem persists, note ALL messages and inform GEMS Field Service.
E19 IDC/SENO down, DPS is OFF	Image Detection Controller system cannot communicate with Generator. The Detector Power Supply has been powered OFF by the system.	1. Power OFF/ON from the X-ray Console. 2. If the problem occurs again at the next acquisition, power OFF the whole system and wait for the end of the shutdown sequence. 3. Restart the system. 4. If the problem persists, note ALL messages and inform GEMS Field Service.
E20 Check Main Distribution Rack	Supply of Control Station and Detector environment circuits is not authorized.	1. Power OFF/ON from the X-ray Console. 2. If the problem persists, note ALL messages and inform GEMS Field Service.
E21 Detector supply not supplied	Supply of Detector circuits is not authorized.	1. Power OFF/ON from the X-ray Console. 2. If the problem persists, note ALL messages and inform GEMS Field Service.
E22 Conditioner not supplied	Supply of detector Conditioner circuits is not authorized.	1. Power OFF/ON from the X-ray Console. 2. If the problem persists, note ALL messages and inform GEMS Field Service.
E23 AWS cart not supplied	Supply of Control Station circuits is not authorized.	1. Power OFF/ON from the X-ray Console. 2. If the problem persists, note ALL messages and inform GEMS Field Service.
E24 Failure before exposure	Current image acquisition aborted before exposure due to failure in the equipment	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service.
E25 AWS/SENO Synchro. fail	A synchronization problem occurred between AWS system and Generator during acquisition. Next exposure is inhibited.	1. Switch OFF the whole system and wait for the end of the shutdown sequence. 2. Restart the system. 3. If the problem persists, note ALL messages and inform GEMS Field Service.

Error messages

Message on X-ray Console	Explanation	Corrective Action
E26 AWS/SENO comm. failure	AWS system cannot communicate with Generator.	1. Power OFF/ON from the X-ray Console. 2. If the problem occurs again at the next acquisition, power OFF the whole system and wait for the end of the shutdown sequence. 3. Restart the system. 4. If the problem persists, note ALL messages and inform GEMS Field Service.
E35 SYSTEM SHUTDOWN STARTED	A complete system power OFF has been started. The Generator will power off supplies to the Detector, Gantry and Generator in a few minutes.	Stop system usage and wait for the end of the shutdown sequence.
E36 CART PWR FAILURE - SHUTDOWN	A system shutdown has been started because an UPS error has been detected or communication with UPS has been lost.	1. Stop system usage and wait for the end of the shutdown sequence. 2. Check the mains power supply. 3. Check (on UPS panel) that the batteries are charging. Do not attempt to restart the system until the batteries have recharged. 4. If the problem persists, note ALL messages and inform GEMS Field Service.
I05 Exposure aborted by mAs level	Exposure aborted because not enough mAs available to continue exposure.	1. Press the Exposure Interrupt button. 2. Reposition the patient. 3. Start exam again. 4. If the problem continues, note ALL messages and contact GEMS Field Service. 5. Nevertheless, you can continue to use the system with manual acquisition.
I06 Abort: Detect sig. out range	Exposure aborted because brightness received by detector is not in range to continue exposure.	1. Press the Exposure Interrupt button. 2. Reposition the patient. 3. Start acquisition again. 4. If the problem continues, note ALL messages and contact GEMS Field Service. 5. Nevertheless, you can continue to use the system with manual acquisition.
I12 Maximum mAs = xxx	Maximum available mAs are equal to xxx.	Information message only. (If mAs exceeded, the exposure is aborted at 2 or 3 mAs if entire exposure cannot be made.)
I13 IDC was not ready	Image Detection Control system was not ready to perform an image acquisition.	1. Press the prep button again. 2. If the problem occurs again at the next acquisition, power OFF the whole system and wait for the end of the shutdown sequence. 3. Restart the system. 4. If the problem persists, note ALL messages and inform GEMS Field Service.

Message on X-ray Console	Explanation	Corrective Action
I14 AWS was not ready	AWS system was not ready to perform an image acquisition.	1. Press the prep button again. 2. If the problem occurs again at the next acquisition, power OFF the whole system and wait for the end of the shutdown sequence. 3. Restart the system. 4. If the problem persists, note ALL messages and inform GEMS Field Service.
I15 Console locked	The X-ray Console is locked due to service access (detector calibration or IQ tool is in progress). Actions on right-hand section of X-ray Console are still available.	Wait until end of service access. If no service in progress, power OFF/ON from the X-ray Console.
I16 Collimator locked	The diaphragm control is locked because detector calibration is in progress.	Wait until end of calibration. If no calibration in progress, power OFF/ON from the X-ray Console.
I17 AWS/SENO comm. lost	AWS system cannot communicate with Generator. A service laptop may be connected in place of the AWS, or the AWS may be powered OFF for service requirements.	1. Wait for completion of the service operation if there is one, or wait one minute to allow the system to recover. 2. If the problem persists, power OFF the whole system and wait for the end of the shutdown sequence. 3. Restart the system. 4. If the problem persists, note ALL messages and inform GEMS Field Service.
I18 Collimator/Console locked	The X-ray Console and the diaphragm control are locked due to service access (detector calibration in progress). Actions on right-hand section of X-ray Console are still available.	Wait until end of service access. If no service in progress power OFF/ON from the X-ray Console.
I19 IDC/SENO comm. lost	The Image Detection Controller system cannot communicate with the Generator. If communication is not recovered in a few minutes, the system will be in failure mode (error E19).	Wait until the Image Detection Controller system recovers.
I21 Heating failure track 1	Molybdenum focal track is out of use.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service. You can continue using rhodium focal track.
I22 Heating failure track 2	Rhodium focal track is out of use.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service. You can continue using molybdenum focal track.

Error messages

Message on X-ray Console	Explanation	Corrective Action
I23 Console communication fail	Generator-X-ray Console connection is faulty.	Power OFF/ON from the X-ray Console. If problem continues, note ALL messages and contact GEMS Field Service.
I24 Line power interruption	Micro power cut occurred on line supply.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service.
I25 Recumbent patient view names	Operator has selected a view name for recumbent patient.	If you do not want to make the acquisition with the selected view name, enter and leave the Setup/View menu without pressing Valid, to return to normal view name selection. The view name selection will return to normal selection after the next exposure.
I27 Generator CPU battery error	CPU backup battery is discharged.	Contact GEMS Field Service. DO NOT REMOVE POWER FROM EQUIPMENT.
I28 Max wait for same exposure mn	It is necessary to wait the displayed time to be able to repeat the same exposure.	Wait the required amount of time to repeat exposure. If an exposure is attempted before this time, an abort may possibly occur (there is a safety margin to ensure proper operation). You can ignore the message if a different, less dense, breast is to be imaged next.
I29 Excessive mAs for this mode mAs	The amount of mAs necessary to repeat the same exposure is too high in the mode selected.	Switch to a different mode or to a different filter.
I31 AOP abort: use manual mode or I31 Abort: Image signal too low	This error indicates that the average signal level of the pre-exposure image is too low to calculate the X-ray parameters for the exposure.	Switch to Manual mode, or ensure that conditions are correct for use of AOP. When using AOP: - Do not use AOP if the breast thickness exceeds 9 cm (3.5 inches). - Ensure that no highly attenuating objects (markers larger than 2 mm², needles, etc.) are inside the AOP sensing zone - Ensure that the collimator blades are outside the FOV. - Ensure that the compression force and thickness measurements are correctly calibrated. - Do not use AOP with a breast containing an implant. If the problem recurs frequently after taking the above precautions, note ALL messages and inform GEMS Field Service.

Message on X-ray Console	Explanation	Corrective Action
I32 AOP abort: use manual mode or I32 Abort: Image signal too high	This error indicates that the average signal level of the pre-exposure image is too high to calculate the X-ray parameters for the exposure.	Switch to Manual mode, or ensure that conditions are correct for use of AOP. When using AOP: - Ensure that the breast extends into the AOP sensing zone. - Verify that the breast thickness is shown as greater than 0 cm on the Gantry Readout. If the problem recurs frequently after taking the above precautions, note ALL messages and inform GEMS Field Service.
I33 Abort: No AOP zone found	This error indicates that no glandular region was found.	- Do not use AOP if the breast thickness exceeds 9 cm (3.5 inches). - Verify that the breast thickness is shown as greater than 0 cm on the Gantry Readout. - Ensure that the breast extends into the AOP sensing zone. - Ensure that no highly attenuating objects (markers larger than 2 mm², needles, etc.) are inside that AOP sensing zone. - Ensure that the compression force and thickness measurements are correctly calibrated.
I34 Thickness out of AOP range	This error indicates that AOP Image Quality can not be ensured, because the breast thickness is outside the AOP thickness range of 0 cm - 9 cm (0 to 3.5 inches).	- Do not use AOP if the breast thickness exceeds 9 cm (3.5 inches). - Verify that the breast thickness is shown as greater than 0 cm on the Gantry Readout. - Ensure that the breast extends into the AOP sensing zone - If the breast is too thick, or it can not be positioned in the AOP sensing zone, use manual exposure control.
I46 System Setting in progress	AWS set-up in progress (loading of Flat Field map) after a new filter was selected.	No action required. This message is displayed for two seconds after selection of a new filter.

Error messages

Message on X-ray Console	Explanation	Corrective Action
I50 Lock Jammed	The system is in degraded mode: Gantry device configuration is not a standard configuration. The system functionality is not optimum.	1) If the installed paddle is not a Senograph DS paddle: A. Remove it. B. Install a Senograph DS paddle. 2) If the installed paddle is a Senograph DS paddle: A. Remove it and reinstall it. B. If the warning persists, check with another Senograph DS paddle. B1. If the warning disappears with another Senograph DS paddle, the paddle that generated the warning is not recognized by the system; the thickness/force measurements with this paddle are not accurate. B2. If the warning persists with another Senograph DS paddle, the thickness/force measurement with all paddles are not accurate.
I51 Lock Overheated	The system is in degraded mode. The tube head fan has failed. As a result, tube cooling is not effective and the tube thermal algorithm could not prevent exposure abort due to tube overheating.	1) The system can continue to be used but please reduce the cadence of use. Add time between exposures and exams to allow the tube to cool. 2) Contact GEMS Field Service to repair the tube head fan.
I90 Auto-Decompression is Off	The automatic decompression mode has been inhibited by the user.	If auto-decompress mode is wanted, switch modes by changing the parameter in the Setup/Medical menu. Otherwise no action is required; this information is normally displayed.
S01 Aborted exposure	Exposure in progress has been aborted because the Exposure Button was released by operator before the end of exposure.	Power OFF/ON from the X-ray Console. Start exam again.
S02 Exposure aborted by HV arcing	Exposure was aborted because more than eight X-ray tube arcing events occurred.	Power OFF/ON from the X-ray Console. Start exam again.
S05 Wrong selection of kV/track couple	Selected kV/focal track is not enabled (kV values are too low in the Rh focal track).	Change the configuration.
S07 Exposure aborted by IDC	The exposure was aborted by the Image Detection Controller.	1. Power OFF/ON from the X-ray Console. 2. If the problem occurs again at the next acquisition, power OFF the whole system and wait for the end of the shutdown sequence. 3. Restart the system. 4. If the problem persists, note ALL messages and inform GEMS Field Service.
S08 Required power is too high	Power requested in Manual Mode is too high.	Reduce kV or mAs values.

Message on X-ray Console	Explanation	Corrective Action
S09 No compression detected	Breast is not compressed.	Breast compression is mandatory for AOP.
S10 Generator cooling mn	Generator requires xxxx minutes to cool.	Wait for cooling period (or select lower mAs values in Manual Mode).
S100 PLEASE WAIT ...	Generator requires xxxx minutes to cool.	Wait for cooling period (or select lower mAs values in Manual Mode).
S11 Tube cooling mn	Tube requires xxxxx minutes to cool.	Wait for cooling to terminate (or select lower mAs values in Manual Mode).
S12 Configuration not allowed	Incompatible settings of magnification, grid, and focal spot have been selected.	Select compatible settings.
S13 Backup mAs < 50 exposure inhibited>	Maximum mAs < 50. Exposure inhibited.	Wait for cooling to terminate (or select lower kV values).
S14 Maximum mAs exceeded	Maximum mAs set at installation are exceeded. This message appears only if a value below the maximum possible mAs value was set at installation.	Reduce the mAs value.
S20 Acq. Abort, image can be lost	Exposure has been fully performed but image may be lost because an error occurred in the image chain detection or processing.	1. Press the Exposure Interrupt button. 2. Check image quality if image is displayed. 3. Start exam again. 4. If the problem persists, power OFF the whole system and wait for the end of the shutdown sequence. 5. Restart the system. 6. If the problem occurs again, note ALL messages and inform GEMS Field Service.
S21 Waiting for AWS boot	Communication with AWS system is not yet established.	1. Wait until AWS boot and login is finished. 2. If message persists 10 min after the AWS login, power OFF the whole system and wait for the end of the shutdown sequence. 3. Restart the system. 4. If the problem persists, note ALL messages and inform GEMS Field Service.
S22 Waiting for IDC boot	Communication with Image Detection Control system is not yet established.	1. Wait until the Image Detection Control boot is finished. 2. If message persists for more than 10 min, power OFF the whole system and wait for the end of the shutdown sequence. 3. Restart the system. 4. If the problem occurs again, note ALL messages and inform GEMS Field Service.
S23 Laterality is not selected	You have not selected the laterality of the breast to perform acquisition. Exposure is inhibited.	Select laterality on the X-ray Console. If you are imaging a test object, the laterality chosen is not important.

Error messages

Message on X-ray Console	Explanation	Corrective Action
S25 Tube housing over temperature	The temperature of the tube housing is too high ($> 65^{\circ}\text{C}$).	Wait for the tube housing temperature to fall.
S26 Exposure too long	The exposure is too long (this message should appear only in Manual mode).	Increase the kV value or reduce the mAs value.
S32 Compression sensor fault	Breast thickness is badly calculated in AOP mode. It is still possible to continue the exam in Manual mode.	Power OFF/ON from the X-ray Console. If the problem continues, note ALL messages and contact GEMS Field Service.
S33 Wait Until End of Digital Acquisit.	Acquisition is inhibited until the previous image has been completely recorded.	No action is required. The display of this message is normal during image transfer to the workstation. It will be cleared when system is ready for the next acquisition. If the problem persists, power OFF/ON from the X-ray Console.
S37 Exp. Abort, Wait Image Acquisition	Exposure in progress has been aborted by the operator or the equipment but the system processed and displayed the generated image.	1. See the message displayed when the Exposure Interrupt button is lit for more information. 2. Press the Exposure Interrupt button and perform the action required by the last displayed message.
S38 Abort by HV arcing, Wait Image Acq.	Exposure was aborted because more than eight X-ray tube arcing events occurred, but the system processed and displayed the generated image.	1. See the message displayed when the Exposure Interrupt button is lit for more information. 2. Press the Exposure Interrupt button and perform the action required by the last displayed message.
S39 Abort by IDC, Wait Image Acquisition	The exposure was aborted by the Image Detection Controller, but the system processed and displayed the generated image.	1. See the message displayed when the Exposure Interrupt button is lit for more information. 2. Press the Exposure Interrupt button and perform the action required by the last displayed message.
S40 Stereo Config/Exam incoherence	After power reset on the X-ray Console, the system has not retrieved the correct configuration.	Request a new stereotactic series by clicking the "New Series" button on the Viewer. The scout image must be acquired again.
S50 SP present, cannot continue exam	Stereotactic Positioner was detected as present with the Routine Medical Application open.	1) If Stereotactic Positioner is present: a) To open the Stereo Medical Application, first close the current exam. b) To use the Routine Medical Application, first remove the Stereotactic Positioner. 2) If Stereotactic Positioner is not present: a) Power OFF/ON from the X-ray Console. b) If the problem persists, shut down the system from the Browser. c) If the problem persists, note ALL messages and contact GEMS Field Service.

Message on X-ray Console	Explanation	Corrective Action
S57 AWS/POS communication lost	AWS cannot communicate with the Gantry. Acquisition is forbidden.	1) Power OFF/ON from the X-ray Console. 2) If the problem persists, shut down the system from the Browser. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
S58 Gantry failure	A gantry failure is active, all gantry movement is inhibited. It is not possible to start an exposure.	1) Power OFF/ON from the X-ray Console. 2) If the problem persists, shut down the system from the Browser. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
S59 Monofocus:magnifi. inhibited	The gantry device configuration does not allow an exam: Unacceptable configurations: - Magnification paddle with Bucky inserted. - Contact paddle with Mag stand inserted. - Gantry paddle and stereotactic positioner both inserted. - Paddle not correctly inserted.	Configure the gantry device in conformance with the medical application: - Mag paddle with Mag stand only. - Contact paddle with Bucky only. - No paddle with either Mag stand or Bucky. - No gantry paddle with the stereotactic positioner. - Paddle correctly inserted.
S60 X-ray beam quality error	An error has occurred in firmware that controls X-ray beam or could affect X-ray beam quality. It could be the paddle detection or the control of the following devices: tube position (focus size), filter, collimator and bucky Note that a more detailed message is displayed (for 5s) on the gantry LCD display.	1) Wait 10 seconds. If this X-ray inhibition remains active, power OFF/ON from the X-ray console. 2) If the problem persists, shut down the system from the Browser. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
S61 X-ray beam not ready	Firmware that controls X-ray beam or could affect X-ray beam quality is not ready for acquisition. It could be the control of the following devices: tube tilt (focal spot size), filter, collimator and Bucky.	1) Wait 30s. If the X-ray inhibition stays active, power OFF/ON from the X-ray console. 2) If the problem persists, shut down the system from the AWS Browser. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
S81 Image detection not ready	One of the image detection components is busy or is not yet ready to acquire images.	1. Wait for completion of system setting. 2. If this X-ray inhibition remains displayed for more than 10 min., switch OFF the whole system and wait for the end of the shutdown sequence. 3. Restart the system. 4. If the problem persists, note ALL messages and inform GEMS Field Service.

Error messages

Message on X-ray Console	Explanation	Corrective Action
S82 Image detection failure	One of the image detection components has failed.	1. Switch OFF the whole system and wait for the end of the shutdown sequence. 2. Restart the system. 3. If the problem persists, note ALL messages and inform GEMS Field Service.
S83 Detector environment not OK	The detector environment is not correct for acquisition.	1. Wait for completion of system setting. 2. If this X-ray inhibition stays displayed for more than 10 min., switch OFF the whole system and wait for the end of the shutdown sequence. 3. Restart the system. 4. If the problem persists, note ALL messages and inform GEMS Field Service.
S84 Image quality is degraded	The temperature has drifted from the optimal value specified for best image quality.	Check image quality on current exam. If the problem persists, note ALL messages and inform GEMS Field Service.
S85 Detector environment failure	Detector environment control has failed.	1. Switch OFF the whole system and wait for the end of the shutdown sequence. 2. Restart the system. 3. If the problem persists, note ALL messages and inform GEMS Field Service.
S86 AWS/IDC Communication lost	AWS system cannot communicate with the Image Detection Controller system but communication should recover.	Wait until the Image Detector Controller system recovers.
S87 AWS/IDC Communication failure	AWS to Image Detection Controller system communication has failed.	1. Switch OFF the whole system and wait for the end of the shutdown sequence. 2. Restart the system. 3. If the problem persists, note ALL messages and inform GEMS Field Service.
S88 AWS image delivery failure	AWS image delivery to medical application failure.	1. If this message stays displayed more than 5 min., switch OFF the whole system and wait for the end of the shutdown sequence. 2. Restart the system. 3. If the problem persists, note ALL messages and inform GEMS Field Service.
S89 AWS not available for acquisition	The AWS cannot allow acquisition because of lack of disk space or an incomplete action on AWS.	1. Check that all actions are complete. 2. Increase free space on image disk by deleting exams that have been archived. 3. If the problem persists, note ALL messages and inform GEMS Field Service.
S90 AWS not available, close exam	No more AWS resources to continue.	1. Close exam. 2. Increase free space on image disk by deleting exams that have been archived. 3. If the problem persists, note ALL messages and inform GEMS Field Service.

Message on X-ray Console	Explanation	Corrective Action
S91 Need user action on AWS	Operator input is required on AWS.	Respond to the AWS pop-up.
S92 AWS busy, please wait...	The AWS is busy, and the current operation may take some time.	No action required, wait for completion of the current operation.
S93 AWS busy	The AWS is busy (the wait should be short).	No action required, wait for completion of the current operation.
S94 System performing test, wait	An application is running on the system and performing tests that do not allow acquisition (example auto-diagnostics).	Wait a few minutes.
S95 Medical Application not active	AWS has not yet entered application mode. This message is always displayed after system boot and after each close exam even during review. It is displayed because no application is ready to get the image.	Start a new exam or QAP acquisition.
S96 System activity conflict	A diagnostic or calibration application is running while the medical application is active.	Check if several applications are running. If yes, close one.
S97 AWS reset in progress, wait	AWS is being reconfigured. The message is displayed until reconfiguration is complete.	No action required.
S98 Exp. inhibited CAL/IQ in progress	AWS is being reconfigured. The message is displayed until reconfiguration is complete.	No action required.
S99 OFFSET ACQUISITION IN PROGRESS	AWS is being reconfigured. The message is displayed until reconfiguration is complete.	No action required.

Error messages

Table 2 Error messages displayed on the AWS monitor

Message on AWS screen		Explanation	Corrective action
AA These messages relate to power on/off events:			
AA1	Error: Could not connect to the remote provider !	The specified remote host could not be found. It may be temporarily off-line, its address may have changed or been incorrectly entered, the application on the remote provider may not be running, or there may be a network error.	1. Try again after a short wait. 2. If the message is repeated, check that the server address is correct and that the remote application is running. 3. If the problem persists, contact your Field Service Representative.
AA2	ATTENTION Do you really want to SHUT DOWN the complete system? This action will stop the workstation and the X generator!	This message appears as part of the normal shutdown sequence.	Click Yes or No as required.
AA3	End of remote connection in progress	A GE Insite connection is being closed.	No action is required; you can now use the system.
AA4	Image detection failure, exam forbidden	An image detection subsystem is not ready for acquisition after start-up.	1. Wait to see if the problem clears. 2. If the problem persists, contact your Field Service Representative.
AA5	Initialization not complete, please wait	A system initialization process is in progress.	Wait until system initialization is complete.
AA6	No Ups Power Backup	A UPS error has been detected or communication with the UPS has been lost.	1. Stop system usage and shut down the system. 2. Check the mains power supply. 3. Check (on UPS panel) that the batteries are charging. Do not attempt to restart the system unless the batteries have been recharged. 4. Restart the system. 5. If the problem persists, contact your Field Service Representative.
AA7	Senograph failure, exam forbidden	A Senographe (Gantry) subsystem is not ready for acquisition after start-up.	1. Wait to see if the problem clears. 2. If the problem persists, contact your Field Service Representative.
AA8	Shutdown Process started ...	The AWS shutdown process has been started because a UPS primary power failure longer than 10 seconds has been detected.	1. Wait for the end of the shutdown sequence. 2. Check mains power supply. 3. Restart the system when power OK. 4. If the problem persists, contact your Field Service Representative.

Error messages

Message on AWS screen		Explanation	Corrective action
AA9	Shutdown Process started ...	The AWS shutdown process has been started because communication with the UPS was lost for more than 30 seconds.	1. Stop system usage and wait for the end of the shutdown sequence. 2. Restart the system. 3. If the problem persists, contact your Field Service Representative.
AA10	Shutdown Process started ...	The AWS shutdown process has been started because a UPS low battery condition was detected (battery power must be available to guarantee safe operation and shutdown in the event of power failure).	1. Stop system usage and wait for the end of the shutdown sequence. 2. Check the mains power supply. 3. Check (on UPS panel) that the batteries are charging. Do not attempt to restart the system until the batteries have recharged. 4. If the problem persists, contact your Field Service Representative.
AA11	System is down. System will power off within 30 seconds: do NOT reboot now! (if system does not turn off, switch off UPS manually)	The message appears at the end of the normal shutdown sequence, when the UPS is about to shut down, to prevent users from trying to reboot.	No action is normally required. If the system fails to shut down completely (the AWS LCD monitor continues to display the message after one or two minutes), switch it off by pressing the UPS OFF button at the front of the Generator Cabinet.
AA12	System not ready, exam forbidden	A system component is not yet ready (after system start-up).	Wait until system initialization is complete before requesting an acquisition.
AA13	UPS battery needs replacing. Please call service	The UPS selftest has detected that the battery requires replacement.	Stop system usage and contact your Field Service Representative.
AA14	UPS output overload. Please call service	An UPS overload condition has been detected.	Stop system usage and contact your Field Service Representative.
BB These messages relate to boot/reset events:			
BB4	AWS reset in progress: please wait	An AWS boot or reset sequence is in progress. The AWS may start an automatic reset if it detects an internal acquisition device error.	Wait until system initialization is complete. If several automatic resets occur, contact your Field Service Representative.
BB6	Communication with UPS not established. Please call service. System will power off within 30 seconds: do NOT log in now!	This message appears at the end of the power-up/boot sequence, if communication cannot be established with the UPS.	1. Wait for the end of the shutdown sequence. 2. Try to restart the system. 3. If the problem is repeated, contact your Field Service Representative.
BB8	Remote connection in progress : do not acquire images	A GE Insite connection is in progress; no new images should be acquired.	No action is required; wait for completion of the connection.

Error messages

Message on AWS screen		Explanation	Corrective action
BB9	Restart browser must be performed to take into account the new configuration	Medical Application Preferences settings have been changed, and Save has been requested. The changes will not take effect until the Browser has been restarted.	Restart the Browser.
BB10	System currently performing self-testing - Please Wait.	The system is busy with internal checks and tests.	No action required; wait for completion of the test.
CC These messages relate to internal disk system or memory problems:			
CC1	ATTENTION Not enough space to continue	Disk system is full.	1. Increase free space on disk system by deleting exams that have been archived. 2. If the problem persists, contact your Field Service Representative.
CC2	AWS not available for acquisition, exam forbidden	The Medical Application cannot allow acquisition because of lack of disk system space or an incomplete action on the AWS.	1. Check that all actions are complete (e.g., close all pop-up windows) and Increase free space on disk system by deleting exams that have been archived. 2. If the problem persists, contact your Field Service Representative.
CC3	Disk space is full, you cannot perform a new exam	Disk system is full.	1. Increase free space on disk system by deleting exams that have been archived. 2. If the problem persists, contact your Field Service Representative.
CC4	Image update failed on disk. You cannot save your last changes to the exam.	Disk system is full or server has failed.	1. Close exam. 2. Increase free space on disk system by deleting exams that have been archived. 3. If the problem persists, contact your Field Service Representative.
CC5	Medical Preferences Application was unable to get last settings	The file containing Medical Application Preferences settings does not exist or has been corrupted.	Note ALL messages and contact your Field Service Representative.
CC6	Medical Preferences Application was unable to save current settings	The new Medical Application Preferences settings could not be saved, probably because of lack of space.	1. Increase free space on disk system by deleting exams that have been archived. 2. If the problem persists, contact your Field Service Representative.
CC7	Out of Memory, exam forbidden	System requirements exceed available AWS memory.	1. Perform system shutdown. 2. Start up system. 3. If the problem persists, contact your Field Service Representative.

Error messages

Message on AWS screen		Explanation	Corrective action
CC8	Reallocation of disk space failed. There is no space available on disk for acquiring more images.	Disk system is full or server has failed.	1. Close exam. 2. Increase free space on disk system by deleting exams that have been archived. 3. Perform system shutdown, then restart system. 4. If the problem persists, contact your Field Service Representative.
CC9	System disk is full	System disk space is full.	1. Close exam. 2. Increase free space on disk system by deleting exams that have been archived. 3. Perform system shutdown, then restart system. 4. If the problem persists, contact your Field Service Representative.
CC10	The DICOM image construction failed.	The system is not able to format acquired image.	1. Close exam. 2. Increase free space on disk system by deleting exams that have been archived. 3. If the problem persists, contact your Field Service Representative.

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Error messages

Table 3 Error Messages Displayed on the Readout Panel at the foot of the Gantry

Message on Gantry Readout	Explanation	Corrective Action
Device removed	The system informs the operator that no device is present. - This message is displayed for 5 seconds when the Bucky or the Stereotactic Positioner is removed.	None. Note that the message is displayed for 5 seconds.
Bucky present	The system informs the operator that the Bucky is present.	If the Bucky is not installed, an error has occurred: 1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
1st Spare Bucky	The system informs the operator that the Bucky detected is not the standard one. It has detected a type of Bucky that should not be used with the current version of the software.	If the system detects this, an error has occurred: 1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
FOV 9x9	The system informs the operator that the selected field of view is 9cm by 9cm.	Press the Field of View button if you want to set another field of view.
FOV 13x18	The system informs the operator that the selected field of view is 13 cm deep and 18 cm wide.	Press the Field of View button if you want to set another field of view.
FOV 13x23	The system informs the operator that the selected field of view is 13 cm deep and 23 cm wide.	Press the Field of View button if you want to set another field of view.
FOV 19x23	The system informs the operator that the selected field of view is 19 cm deep and 23 cm wide.	Press the Field of View button if you want to set another field of view.
1.5 Mag stand present. Remove face shield if present!	The system informs the operator that the magnification platform (1.5) is present and reminds the operator that the face shield must be removed for the diagnostic application.	1) If the magnification platform (1.5) is installed, remove the face shield if not yet done. 2) If the magnification platform is not installed, an error has occurred: a) Power OFF/ON from the X-ray Console. b) If the problem persists, note ALL messages and contact GEMS Field Service.
1.8 Mag stand present. Remove face shield if present!	The system informs the operator that the magnification platform (1.8) is present and reminds the operator that the face shield must be removed for the diagnostic application.	1) If the magnification platform (1.8) is installed, remove the face shield if not yet done. 2) If the magnification platform is not installed, an error has occurred: a) Power OFF/ON from the X-ray Console. b) If the problem persists, note ALL messages and contact GEMS Field Service.

Message on Gantry Readout	Explanation	Corrective Action
2D Large Localization Paddle. Maximum recommended force is 20daN.	The system informs the operator that the "Biopsy" paddle is present and reminds the operator that it is recommended to not exceed 20daN with this paddle.	If the "Biopsy" paddle is not installed, an error has occurred: 1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
No defined paddle	The system informs the operator that it does not detect a Senographe DS paddle.	If you observe this message when a Senographe DS paddle is present, contact GEMS Field Service.
Round Spot Magnification paddle	The system informs the operator that the "Round Mag Stand" paddle is present. This paddle should be used with a magnification platform.	If the "Round Mag Stand" paddle is not installed, an error has occurred: 1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
Axillary paddle	The system informs the operator that the "Axillary" paddle is present.	If the "Axillary" paddle is not installed, an error has occurred: 1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
19x23 paddle	The system informs the operator that the "19x23 Standard" paddle is present.	If the "19x23 Standard" paddle is not installed, an error has occurred: 1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
Flexible 19x23 paddle	The system informs the operator that the "19x23 Phlexis" paddle is present.	If the "19x23 Phlexis" paddle is not installed, an error has occurred: 1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
Round spot paddle	The system informs the operator that the "Round spot" paddle is present.	If the "Round spot" paddle is not installed, an error has occurred: 1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
2D Spot Localization Paddle. Maximum recommended force is 20daN	The system informs the operator that the "Spot Biopsy" paddle is present and reminds the operator that it is recommended to not exceed 20daN with this paddle.	If the "Spot Biopsy" paddle is not installed, an error has occurred: 1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
Square Magnification paddle	The system has detected that the 2D Spot localization paddle is present and reminds the Operator that it is recommended to not exceed 20daN with this paddle.	If the 2D Spot localization paddle is not installed, an error has occurred: 1. Power OFF/ON from the X-ray Console. 2. If the problem persists, note ALL messages and contact your Field Service Representative.

Error messages

Message on Gantry Readout	Explanation	Corrective Action
Square Spot Paddle	The system informs the operator that the "Square Spot" paddle is present.	If the "Square Spot" paddle is not installed, an error has occurred: 1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
19x23 Magnification paddle	The system informs the operator that the "Standard Mag Stand" paddle is present. This paddle should be used with a magnification platform.	If the "Standard Mag Stand" paddle is not installed, an error has occurred: 1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
Unexpected paddle type	Paddle device error	Note ALL messages and contact GEMS Field Service.
Unknown paddle type	The system informs the operator that the installed paddle is not recognized.	If the paddle is a Senographe DS accessory: 1) Remove the paddle and insert it again. 2) If the message is still displayed after inserting: A. Power OFF/ON from the X-ray console. B. If the problem persists, use another Senographe DS paddle. C. If the problem persists, note ALL messages and contact GEMS Field Service.
A02 Compression force is applied	Lift and rotation movements are not allowed because a compression force is applied.	Decompress the breast (move the paddle holder up) if you want to perform a rotation or a lift movement.
A03 Compression is not operational	Lift, rotation and compression movements are not allowed because the compression device is not operational. Compression status is temporarily unknown.	None
A04 Compression status is unknown	A lift or rotation movement has been requested while the Stereotactic Positioner is not ready.	1) If the Stereotactic Positioner has just been installed, wait for the "READY" message on the SP display before pressing a footswitch or control movement button. 2) If "COMMUNICATION NOT ESTABLISHED" is displayed on the SP display, perform the corrective action for this error. When the system has recovered, move the gantry as required. 3) Check the X-ray Console for error messages and perform appropriate corrective actions. 4) If the problem persists, power OFF/ON from the X-ray Console. 5) If the problem persists, note ALL messages and contact GEMS Field Service.

Message on Gantry Readout	Explanation	Corrective Action
A05 Compression upper position is reached	1) Compression release movement is stopped because the upper position with the current paddle is reached. or 2) The upper position of the paddle holder is reached.	1) If you have a paddle, remove it to go to the paddle holder upper position. or 2) If the paddle is removed and the paddle holder is not at upper position, note ALL messages and contact GEMS Field Service.
A06 Lift end position is reached	Lift up or down movement is stopped because the upper or lower position is reached.	Move the lift in the opposite way.
A07 Lift is not operational	Lift movement is not allowed because the lift device is not operational.	None
A08 Max manual compression force is reached	The system informs the operator that the maximum force allowed is reached.	No more compression is available, even using manual compression.
A09 Max power driven compression force is reached	The system informs the operator that the maximum force allowed for motorized movement is reached.	1) Use the manual control to compress more. 2) If the maximum power driven force is < 20daN use the Medical Menu to set a higher value.
A10 Motion stopped. Multiple movements are requested	The current movement is stopped because another non-compatible movement is requested: This advisory message occurs: A. If you press a user interface (button or footswitch) during a pre-set movement. B. If you press a pre-set button while a previous movement is in progress (including deceleration phase).	Release all footswitches or buttons and wait for all movement to stop before pressing on the footswitch or the gantry control movement button again.
A12 Move tube head to center position	Rotation movement has been requested with the tube head angled away from the center position (0°).	1) If the Stereotactic Positioner is installed, switch back to angulation mode and move tube head to the center position (0°). 2) If the Stereotactic Positioner is not installed, an error has occurred: A. Power OFF/ON from the X-ray Console. B. If the problem persists, note ALL messages and contact GEMS Field Service.
A14 Risk of collision with floor	Lift or Rotation movement is stopped to avoid a collision with the floor.	Select another incidence.

Error messages

Message on Gantry Readout	Explanation	Corrective Action
A15 Rotation end position is reached	The rotation movement is stopped because it reaches its rotation limit. - Max negative rotation is -165° - Max positive rotation is +185°	1) If you want to reach the From Below position rotate the arm to +180° (max negative rotation is -165°) 2) If the system stops before reaching +185° or -165° position, note ALL messages and contact GEMS Field Service.
A18 Rotation is not operational	Rotation movement is not allowed because the Rotation device is not operational.	none
A23 Compression lower position is reached	Compression movement is stopped because the lower position of the paddle holder is reached. - You get this error when you perform a compression movement without a paddle or with a paddle for magnification mode without the magnification platform installed.	1) Move the paddle holder up (press the compression release footswitch). 2) If you have the Bucky installed, perform compression with a paddle intended for use in contact mode (with the Bucky). 3) If you get this message with a paddle intended for use in contact mode (not magnification) and with the Bucky installed, an error occurred. Note ALL messages and contact GEMS Field Service.
A24 Maximum compression force is reached	The system informs the operator that the maximum force allowed is reached.	No more compression is available, even using manual compression.
A25 Button disabled (was pressed at boot). Use other keypad or reboot.	A Gantry button was pressed during the boot sequence while the Gantry checked its devices. The button that was pressed is not functional until the next reboot.	1) If you have pressed a button: If you want to use this user interface power OFF/ON from the X-ray Console. If not, continue to use the system with this button non-functional. 2) Even if you have not pressed a button during the boot sequence, a user interface will not be functional: A. To avoid problems during an exam, power OFF/ON from the X-ray Console. B. If this message occurs frequently, contact GEMS Field Service.
A26 Something is preventing decompression movement	To avoid pinching patient or operator body part between the paddle (or paddle holder) and the face shield (or tube head), the decompression motion stopped as soon as a negative force was detected.	1) Check if something is pressing on the paddle that could prevent continuing or starting a compression release movement. A. If an object is stopping the movement, move this object to allow motorized decompression. B. If the patient is pressing on the paddle, try to change her position to allow motorized decompression. 2) If error occurs again while space is free, use the manual decompression. 3) If the problem persists, note ALL messages and contact GEMS Field Service.

Message on Gantry Readout	Explanation	Corrective Action
H01 Button interface comm. failure	The system is set in emergency mode: - A button failure occurred;; the system is set in "halt" state. - It is not possible to perform any movement or image acquisition.	1) Decompress the patient using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H02 Compression comm. failure	The system is set in emergency mode: - The compression device is not communicating; the system is set in "halt" state. - It is not possible to perform any movement or image acquisition.	1) Decompress the patient using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H03 Compression control failure	The system is set in emergency mode: - The compression device has failed; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H04 Internal software error	The system is set in emergency mode: - An error occurred on the Gantry CPU; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H05 Internal software error	The system is set in emergency mode: - An error occurred on the Gantry CPU; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H06 Lift communication failure	The system is set in emergency mode: - The Lift device is not communicating, the system is set in "halt" state. - It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H07 Lift control failure	The system is set in emergency mode: - The Lift device is failed; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.

Error messages

Message on Gantry Readout	Explanation	Corrective Action
H08 Power supply unit comm. Failure	The system is set in emergency mode: - The Power unit is not communicating; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H09 Reset the system. Reload the SW	The system is set in emergency mode: - An error occurred on the Gantry CPU; the system is set in "halt" state. (occurred only during software upgrade) -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H10 Reset the system. Reload the SW	The system is set in emergency mode: - An error occurred on the Gantry CPU; the system is set in "halt" state. (occurred only during software upgrade) -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H11 Reset the system. Reload the SW	The system is set in emergency mode: - An error occurred on the Gantry CPU; the system is set in "halt" state. (occurred only during software upgrade) -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H12 Reset the system. Reload the SW	The system is set in emergency mode: - An error occurred on the Gantry CPU; the system is set in "halt" state. (occurred only during software upgrade) -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H13 Rotation communication failure	The system is set in emergency mode: - The Rotation device is not communicating, the system is set in "halt" state. - It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.

Message on Gantry Readout	Explanation	Corrective Action
H14 Rotation control failure	The system is set in emergency mode: - The Rotation device is failed; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H17 Stop motion control line failed	The system is set in emergency mode: - Stop movement command failure; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H18 Stop motion line active	The system is set in emergency mode: - The stop movement button has been pressed; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H19 Compression footswitch failure	The system is set in emergency mode: - Compression footswitch failure; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H20 Lift footswitch failure	The system is set in emergency mode: - Lift footswitch failure; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H21 Lift software error	The system is set in emergency mode: - An error occurred on lift device CPU; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H22 Halt. Uncontrolled lift motion	The system is set in emergency mode: - Uncontrolled lift movement; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.

Error messages

Message on Gantry Readout	Explanation	Corrective Action
H23 Rotation brake failure	The system is set in emergency mode: - The arm rotation brake has failed; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H24 Rotation software error	The system is set in emergency mode: - An error occurred on the rotation device CPU; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H25 Halt. Rotation Uncontrolled	The system is set in emergency mode: - Uncontrolled Rotation movement; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H27 Compression brake failure	The system is set in emergency mode: - The compression device is in fault state; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Power OFF/ON from the X-ray Console. 2) Try to perform compression motion. If the problem persists, note ALL messages and contact GEMS Field Service.
H28 Control button failure on arm	The system is set in emergency mode: - An arm movement control button on an arm keypad (behind the image receptor, left or right) has failed; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H29 Control button failure on head	The system is set in emergency mode: - An arm movement control button on an X-ray tube head keypad (left or right) has failed; the system is set in "halt" state. -It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.

Message on Gantry Readout	Explanation	Corrective Action
H30 Please turn off control console	The system cannot shut down the generator and X-ray console. - case A. Following an operator request on the browser. - case B. Following a generator error that requested generator shutdown. A system shut down should be requested manually.	1) Power OFF on the X-ray console (immediately in case B!). 2) If the error occurred during a normal shut down: A. Note ALL messages and contact GEMS Field Service to inform the field engineer that the system should be shut down itself. B. You can continue to use the system but you must power OFF from the X-ray console at the next occurrence of this error.
H31 Positioner power supply failure	The system is set in emergency mode: - Gantry power supply failure; the system is set in a "halt" state. - It is not possible to perform any movement or image acquisition.	1) Decompress the patient, using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H32 Tube head control failure	The system is in emergency mode: - Control command from tube head has failed, the system is set to "halt" state. - It is not possible to perform any movement or image acquisition.	1) Uncompress the patient using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
H34 Tube head communication failure	The system is in emergency mode: - Tube head control is not communicating, the system is set to "halt" state. - It is not possible to perform any movement or image acquisition.	1) Uncompress the patient using the manual compression knobs. 2) Power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
W01 Internal software error	An error occurred on the Gantry CPU that does not affect the current system use.	Note ALL messages and inform GEMS Field Service at next field service maintenance.
W02 Internal software error	An error occurred on the Gantry CPU that does not affect the current system use.	Note ALL messages and inform GEMS Field Service at next field service maintenance.
W03 Internal software error	An error occurred on the Gantry CPU that does not affect the current system use.	Note ALL messages and inform GEMS Field Service at next field service maintenance.
W04 Internal software error	An error occurred on the Gantry CPU that does not affect the current system use.	Note ALL messages and inform GEMS Field Service at next field service maintenance.
W05 Internal software error	An error occurred on the Gantry CPU that does not affect the current system use.	Note ALL messages and inform GEMS Field Service at next field service maintenance.

Error messages

Message on Gantry Readout	Explanation	Corrective Action
W06 Invalid language. Default is used	The Gantry CPU received incorrect language information and will use the default value. The default language value is the English language.	1) Power OFF/ON from the X-ray Console. 2) If the problem persists, continue to use the system with English language set. Note ALL messages and contact GEMS Field Service.
W07 Control buttons error	An error occurred on an arm control button keypad, which does not affect the current system use.	Note ALL messages and inform GEMS Field Service at next field service maintenance.
W08 A footswitch is pressed	An error occurred on a footswitch device that does not affect the current system use.	Note ALL messages and inform GEMS Field Service at next field service maintenance.
W09 Gantry Readout failure	The gantry readout has failed.	Contact GEMS Field Service.
W10 Lift calibration error	The lift device is not well calibrated; no movement will be available until the lift device will be well calibrated.	Note ALL messages and contact GEMS Field Service.
W11 Lift control error	An error occurred during lift movement that does not affect the safety control but the speed profile only.	Note ALL messages and contact GEMS Field Service.
W12 Lift end position exceeded	The Lift movement has stopped at a firmware limit, but should have stopped before.	1) Use lift slow speed in the upper and lower limit area. 2) Note ALL messages and contact GEMS Field Service.
W15 Rotation calibration error	The rotation device is not correctly calibrated; no movement will be available until the rotation device has been correctly calibrated.	Note ALL messages and contact GEMS Field Service.
W16 Angulation control error	An error occurred on the Rotation/Angulation clutch/brake control.	1) If an exam is currently in progress continue it, using the same rotation incidence. 2) Move away from 0° and return to 0°; try again to switch to rotation mode. 3) If the problem persists, move the compression paddle up, switch to rotation mode, perform rotation, and return to angulation mode. 4) If the problem persists, power OFF/ON from the X-ray Console. 5) If the problem persists, note ALL messages and contact GEMS Field Service.
W17 Rotation control error	An error occurred during rotation movement. It does not affect the safety control, but only the speed profile.	Note ALL messages and contact GEMS Field Service.

Message on Gantry Readout	Explanation	Corrective Action
W18 Rotation end position exceeded	A rotation movement has stopped at a firmware limit, but should have stopped before.	1) Use rotation slow speed in the upper and lower limit area. 2) Note ALL messages and contact GEMS Field Service.
W21 A button is pressed on the arm keypad	An arm movement control button on an arm keypad (behind the image receptor, left or right) was pressed during the boot sequence while the Gantry checked its devices. The button that was pressed is not functional until the next reboot.	1) If you have pressed a button: If you want to use this user interface, power OFF/ON from the X-ray Console. If not, continue to use the system with this button non-functional. 2) Even if you have not pressed a button during the boot sequence, a user interface will not be functional: A. To avoid problems during an exam, power OFF/ON from the X-ray Console. B. If this message occurs frequently, contact GEMS Field Service.
W22 Compression calibration error	The compression device is not correctly calibrated; no movement will be available until the compression device has been correctly calibrated.	Note ALL messages and contact GEMS Field Service.
W23 Compression control error	An error occurred during compression movement; it does not affect the safety control, but only the speed profile.	Note ALL messages and contact GEMS Field Service.
W24 A button is pressed on the head keypad	An arm movement control button on a X-ray tube head keypad (left or right) was pressed during the boot sequence while the Gantry checked its devices. The button that was pressed is not functional until the next reboot.	1) If you have pressed a button: If you want to use this user interface, power OFF/ON from the X-ray Console. If not, continue to use the system with this button non-functional. 2) Even if you have not pressed a button during the boot sequence, a user interface will not be functional: A. To avoid problems during an exam, power OFF/ON from the X-ray Console. B. If this message occurs frequently, contact GEMS Field Service.
W25 Tube cooling; fan error	The system is in degraded mode: - The tube head fan has failed. As a result, tube cooling is not efficient and the tube thermal algorithm could not prevent exposure abort due to tube overheating.	1) The system can continue to be used but please reduce the cadence of exposures: Add time between exposures and exams to allow the tube to cool. 2) Contact GEMS Field Service to repair the tube head fan.
W26 Positioner power supply error	An error is detected by the Gantry power unit that does not affect the safety control.	Note ALL messages and contact GEMS Field Service.

Error messages

Message on Gantry Readout	Explanation	Corrective Action
W27 Positioner power supply over temperature	Gantry power unit cooling is in a fault condition; the system risks being set to an emergency state.	1) Note ALL messages and contact GEMS Field Service. 2) You can continue to use the system but power OFF from the X-ray Console as soon as you can.
W28 Switching off Gantry...	Gantry power OFF sequence is in progress.	Wait for the end of the power OFF sequence.
W29 Paddle detection error	Paddle detection has failed, or paddle type identification label is not aligned with the detection window.	1. Remove the paddle and insert it again. 2. If the error persists, try using another paddle. 3. If the problem persists, note ALL messages and contact GEMS Field Service.
W30 Check sliding paddle position	AOP mode (Automatic Optimization of Parameters) is inhibited when the paddle type is not recognized.	If the paddle is a Senographe DS accessory: 1) Remove the paddle and insert it again. 2) If the message is still displayed after inserting: A. Power OFF/ON from the X-ray console. B. If the problem persists, use another Senographe DS paddle or perform the acquisition in Manual mode. C. If the problem persists, note ALL messages and contact GEMS Field Service.
W31 No defined paddle detected	An error occurred during lift movement that does not affect the safety control but does not allow knowledge of the absolute lift position. A consequence of this error is that rotation movement will not be stopped in order to avoid collision with the floor.	None. Be careful when performing motion with tube head near the floor.
X01 AWS communication failure	The Gantry state cannot allow an acquisition: - The Gantry is not communicating with the AWS. - It is not possible to perform an image acquisition.	1) Power OFF/ON from the X-ray Console. 2) If the problem persists, shut down the system from the Browser. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
X02 Bucky communication failure	The Bucky state cannot allow an acquisition: - The Bucky is not communicating. - It is not possible to perform an image acquisition.	1) Unplug the Bucky. 2) Reinstall the Bucky: check that it is correctly installed and switched on (initialization noise heard). 3) Power OFF/ON from the X-ray Console. 4) If the problem persists, note ALL messages and contact GEMS Field Service.
X03 Bucky control failure	The Bucky state cannot allow an acquisition: - The Bucky device is in a fault state. - It is not possible to perform an image acquisition.	1) Unplug the Bucky. 2) Reinstall the Bucky: check that it is correctly installed and switched on (initialization noise heard). 3) Power OFF/ON from the X-ray Console. 4) If the problem persists, note ALL messages and contact GEMS Field Service.

Message on Gantry Readout	Explanation	Corrective Action
X04 Collimation communication failure	The Field Of View cannot be set at the correct format: - The Collimator is not communicating. - It is not possible to perform an image acquisition.	1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
X05 Collimation control failure	The Field Of View cannot be set at the correct format: - The Collimation function is failed. - It is not possible to perform an image acquisition.	1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
X06 Generator communication failure	The Gantry state cannot allow an acquisition: - The Gantry is not communicating with the Generator. - It is not possible to perform an image acquisition.	1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
X07 Invalid bucky type	The Gantry does not recognize the Bucky device. - It is not possible to perform an image acquisition.	1) Unplug the Bucky. 2) Reinstall the Bucky: check that it is correctly installed and switched on (initialization noise heard). 3) Power OFF/ON from the X-ray Console. 4) If the problem persists, note ALL messages and contact GEMS Field Service.
X09 Compression paddle detection error	The Gantry does not recognize the paddle. - The compression thickness cannot be computed accurately. - It is not possible to continue the current exam, exposure is inhibited.	1) Remove and reinstall the paddle. 2) If the problem persists, power OFF/ON from the X-ray Console. 3) If the problem persists, note ALL messages and contact GEMS Field Service.
X10 X-ray beam form software error	An error occurred during X-ray beam format computation by the Gantry CPU. - It is not possible to perform an image acquisition.	1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
X11 Tube head communication failure	The tube focal spot size cannot be set: - The tube head device is not communicating. - It is not possible to perform an image acquisition.	1) If you hear the tube tilt motor, the system is trying to recover itself. 2) If the message "S61 X-ray beam not ready" is present more than 60s on the x-ray control console, power OFF/ON from the X-ray console. 3) If the problem persists, shut down the system from the Browser. 4) If the problem persists, note ALL messages and contact GEMS Field Service.

Error messages

Message on Gantry Readout	Explanation	Corrective Action
X12 Tube head control failure	The tube focal spot size cannot be set: - The tube head device has failed. - It is not possible to perform an image acquisition.	1) If you hear the tube tilt motor, the system is trying to recover itself. 2) If the message "S61 X-ray beam not ready" is present for more than 60 seconds on the x-ray control console, power OFF/ON from the X-ray console. 3) If the problem persists, shut down the system from the Browser. 4) If the problem persists, note ALL messages and contact GEMS Field Service.
X13 X-ray beam adjustment error	The tube head device that positions the tube to get the correct X-ray beam position has detected an error. - The tube focal spot size cannot be set correctly. - It is not possible to perform an image acquisition.	1) If you hear the tube tilt motor, the system is trying to recover itself. 2) If the message "S60 X-ray beam quality error" is present for more than 10s on the X-ray control console, power OFF/ON from the X-ray console. 3) If the problem persists, shut down the system from the AWS Browser. 4) If the problem persists, note ALL messages and contact GEMS Field Service.
X14 X-ray beam form calibration error	The tube focal spot size cannot be set correctly. - It is not possible to perform an image acquisition except during calibration.	Note ALL messages and contact GEMS Field Service.
X15 Collimator command error	The collimator device that positions the collimator blades detected an error. - The Field Of View cannot be set correctly. - It is not possible to perform an image acquisition.	1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
X16 Collimator control failure	The collimator device has failed: - The Field Of View cannot be set correctly. - It is not possible to perform an image acquisition.	1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
X17 Collimator software error	An error occurred on the collimator device CPU: - The Field Of View and the filter cannot be set correctly. - It is not possible to perform an image acquisition.	1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.
X18 Filter command error	The Filter device that positions the filter detected an error. - The filter cannot be set correctly. - It is not possible to perform an image acquisition.	1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.

Error messages

Message on Gantry Readout	Explanation	Corrective Action
X19 Filter control failure	The Filter device has failed: - The filter cannot be set correctly. - It is not possible to perform an image acquisition.	1) Power OFF/ON from the X-ray Console. 2) If the problem persists, note ALL messages and contact GEMS Field Service.

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Chapter 17 Specifications

1 Technical specifications

1-1 Electrical specification

Mode of operation: Continuous operation with intermittent loading.

1-1-1 Line voltage specifications

- Single-phase input voltage (phase-neutral or phase-phase):
 - 200/208/220/240 V ($\pm 10\%$)
- Line frequency specification: 50 or 60 Hz (± 1 Hz)
- Classification:
 - Type of protection against electric shock: CLASS 1.
 - Degree of protection against electric shock: TYPE B.
- Maximum line current of the system: 42 A at 180 VAC, based on maximum input voltage (30 kV) and output current (100 mA) of the tube housing assembly.
The maximum line current corresponds to the use of the technique factors 30 kV, Mo track, large focal spot and 100 mAs or more.

1-1-2 kVA load characteristics

- Maximum instantaneous power (during exposures, up to 6 seconds) 9 kVA.
- Power factor: 0.6

1-1-3 Input impedance

The apparent resistance of the mains supply R_L must be less than that which would cause a voltage drop of 6% at the maximum power load of 9 kVA. Refer to the table below for relevant values:

Nominal voltage (V ac)	200	208	220	240
Maximum impedance R_L (ohms)	0.28	0.30	0.34	0.40

1-1-4 Generator output (excluding tube)

- 22 through 49 kV,
- 20 through 130 mA.

1-1-5 Duty cycle

The generator is always limited by the tube: the generator can supply a maximum of 100 W to the tube.

- For an exposure under 40 kV, the system is limited by the tube mean current (2.5 mA).
Duty cycle is 30 kV/150 mAs exposure each minute.
- For an exposure over 40 kV, the system is limited by the generator mean power (100 W).
Duty cycle is 48 kV/125 mAs exposure each minute.

1-1-6 Line conditioner resonance frequency

- 20 kHz approx.

1-1-7 Generator power (excluding tube)

- 5 kW maximum.

1-2 Maximum tolerance of displayed constants

kV and mAs:

- kV: $\pm 5\%$
- mAs: $\pm (7.6\% + 1.1 \text{ mAs})$

Measurement Conditions:

- kVp:
Connect an HV voltage divider (Machlett Dynalizer IIIA; ratio 10 kV/1 V) in series with the x-ray tube and measure the voltage with a multimeter (Fluke 45 or 87).
- mAs:
Connect an HV voltage divider (Machlett Dynalizer IIIA; ratio 10 kV/1 V) in series with the x-ray tube. Connect a waveform analyzer (Tektronix 7854) to the output of the divider; the analyzer receives a signal proportional to the voltage applied to the tube. The mAs values are given by:

$$\text{mAs} = \int_{T1}^{T2} i dt$$

Where T1 is the time at which the high voltage reaches 75% of its maximum value, and T2 is the time at which the high voltage returns to 75% of the maximum value.

Compression force and breast thickness:

- Compression Force: ± 10 newton
- Breast Thickness: ± 10 mm

1-3 Digital Detector

- Field of View (FOV) of the Digital Detector: 19 cm x 23 cm
- Digital detector type: GEMS amorphous silicon
- Pixel format: X=1920 Y=2304
- Detector element size: 100 microns

1-4 Workstation storage

Total internal disk capacity: 250 Gbytes.

Allocated for image storage: 194 Gbytes (corresponding to approximately 11000 acquisitions).

2 Radiation and filter Information

2-1 Source to Image Distance (SID)

- Fixed SID: 660 mm

2-2 Radiation reference axis

Conforming to standard mammography practice, the radiation reference axis is directed at the chest wall edge of the digital detector; radiation is shielded so that there is no radiation directed behind the chest wall.

2-3 Leakage technique factors

With respect to radiation regulation, the tube housing and the collimator are in compliance with DHHS 21 CFR1020:

Leakage technique factors applicable: 49 kV at 2 mA.

2-4 Nominal X-ray tube voltages and currents

- Nominal X-ray tube voltage and the highest X-ray tube current available at that voltage:
49 kV; 61.2 mA
- Highest X-ray tube current and the highest X-ray tube voltage available at that current:
100 mA; 30 kV
- Corresponding combination of X-ray tube voltage and X-ray tube current which results in the highest electrical output power (3 kW):
30 kV; 100 mA or 49 kV; 61.2 mA
- Nominal electric power given as the highest constant electric power (in kW) which the X-ray generator can deliver, for a loading time of 0.1 s at an X-ray tube voltage of 30 kV:
 $100 \text{ mA} \times 30 \text{ kV} = 3 \text{ kW}$

2-5 Irradiation in AOP mode

- Nominal shortest irradiation time in AOP mode: 40 ms.
- Range of X-ray tube voltage during irradiation in AOP mode: 24 through 35 kVp.
- Range of X-ray tube current during irradiation in AOP mode: 30 through 100 mA.

2-6 Nominal focal spot size

- Large focal spot: 0.3 mm.
- Small focal spot: 0.1 mm.

2-7 Filters and anode tracks

Maximum current for each track/focal spot configuration:

Focal spot	Track	
	Mo	Rh
Large	100 mA max.	62 mA max.
Small	40 mA max.	35 mA max.

The minimum filtration permanently installed in the useful beam of the X-ray tube is 0.008 mm aluminum equivalent (8 μ m aluminum equivalent) at 30 kV corresponding to the minimum thickness of beryllium of the x-ray tube output window.

The switched filters are installed on a disk driven by a stepping motor which moves from one filter to the other. Two different filters are supplied:

- Molybdenum: 0.03 mm,
- Rhodium: 0.025 mm,

Note:

The system electronics control the filters according to operator requirements in Manual mode, or to software requirements in AOP mode

TARGET	VOLTAGE (kV)	FILTER	EQUIVALENCE (half-value layer)
Molybdenum	30	0.03 Mo	0.3 mm Al minimum
Molybdenum	30	0.025 Rh	0.35 mm Al minimum
Rhodium	30	0.025 Rh	0.4 mm Al minimum

2-8 Attenuation equivalence

Attenuation equivalence for components in the X-ray beam (in accordance with FDA HHS 21 CFR, § 1020.30; measurements made at a potential of 100 kVp, using an X-ray beam with an HVL of 2.7 mm of aluminum)

Component	Al equivalence (mm)
Magnification stand (1.5 and 1.8)	less than 0.35
Image receptor support	less than 0.2
Bucky cover	less than 0.2
Stereotix positioner	less than 0.3

2-9 Main characteristics of the grid

- Type: linear
- Number of lines: 31 line pairs/cm.
- Grid ratio: R 5 : 1.
- Focal length: F0 = 650 mm

3 Ambient Conditions

3-1 Operational ambient conditions

- Humidity: 10% min., 80% max.
- Temperature: 15°C (59°F) min., 35°C (95°F) max.
- Atmospheric pressure: 700 hPa min., 1060 hPa max.

3-2 Transport and storage ambient conditions

- Humidity: 10% min., 50% max.
95% max. may be tolerated for no longer than two weeks.
- Temperature: + 10°C (50°F) min., 25°C (77°F) max.
A wider range of -10°C (14°F), min. 50°C (122°F) max. can be tolerated for no longer than one day.
- Atmospheric pressure: 500 hPa min., 1060 hPa max.

3-3 Ambient light level

Senographe DS monitors are adjusted for use in light levels up to 50 lux.

4 Tube information

Tube Cooling Curves and other tube-specific technical parameters can be found in the Tube Product Data document, part no. 2281990-100, included with the system documentation.

5 Dimensions and Weights

Component	Dimensions in mm (<i>inches</i>)			Weight
	Depth	Width	Height	kg (<i>lbs</i>)
Gantry	1273 (50.1)	min. 616 (24.25) max. 1842 (72.5)	min. 1930 (76) max. 2626 (103.4)	410 (904)
Generator cabinet	640 (25.2)	436 (17.2)	1330 (52.4)	175 (386)
Control station with radiation shield, monitor, and X-ray console	400 (15.75)	710 (28)	2225 (87.6)	210 (463)

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Revision History

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REV	DATE	REASON FOR CHANGE
1	January 25, 2005	Release Nephtys M5B level systems. Based on document 5131764-2-1xx rev 1, with the following changes: - Ch 16 Error Messages, Table 3 : - Neph mess 449 "1.5 Mag stand present. Remove face shield!" modified - Neph mess 448 "1.8 Mag stand present. Remove face shield!" modified - Neph mess 438, Neph mess 434 "2D Large Localization Paddle. Maximum recommended force for this paddle is 20daN." modified - Neph mess 442 "Round Spot Magnification paddle" modified - Neph mess 430 "19x23 paddle" modified - Neph mess 429 "Flexible 19x23 paddle" modified - Neph mess 435 "2D Spot Localization Paddle. Maximum recommended force for this paddle is 20daN." modified - Neph mess 443 "Square 7x7 Magnification paddle" modified - Neph mess 440 "19x23 Magnification paddle" modified - Neph mess 1261 "H32 Tube head control failure" added - Neph mess 1262 "H34 Tube head communication failure" added - Neph mess 1265 "W32 Take care, floor anti-collision is disabled" added - Neph mess 466 "S59 Gantry device config. not allowed" Explanation and Corrective Action modified - Neph mess 465 "S60 X-ray beam adjustment error" replaced by "S60 X-ray beam quality error", Explanation and Corrective Action modified - Neph mess 464 "S61 X-ray beam not ready" Explanation and Corrective Action modified - Neph mess 436 "Unknown paddle type" Corrective Action modified - Neph mess 383 "X13 X-ray beam adjustment error" Explanation and Corrective Action modified - Neph mess 1231 "W29 Paddle detection error" added - Neph mess 252 "H15 Stereotactic Pos. comm. Failure" added - Neph mess 1255 "A26 Something is preventing decompression movement" added - Neph mess 1256 "W31 No defined paddle detected" added - Ch 15 Maintenance, Section 2-1 Planned maintenance performed by the Field Service Engineer, added planned maintenance calendar. Also, in first sentence Section 2-1: replaced should by shall.

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REV	DATE	REASON FOR CHANGE
1		- Breast support terminology: - Replaced "biopsy paddle" by "2D large localization paddle" - Replaced "(small round) spot biopsy paddle" by "2D spot localization paddle" - Replaced "magnification platform" by "magnification stand" - Replaced "square spot magnification paddle" by "7x7 square magnification paddle" - Replaced "cross-hair" by "2D cross-hair localizer" - Replaced "Phlexis" by "flexible" - Replaced "small round spot paddle" by "round spot paddle" - Ch 5 Control Station, Section 1-2 Control Station Hardware, replaced photo of control station with CSV2 with mouse in place of trackball. - Ch 1 Control Station, Section 2 System Components, replaced photo of control station with CSV2 with mouse in place of trackball. - Pointing devices: Trackball becomes optional, mouse becomes standard pointing device. - Ch 5 Control Station, Section 1-2 Control Station Hardware, added a Caution about using only the handle to reorient the LCD monitor to avoid pinching. - Ch 15 Maintenance: - created Section 1-1 Monitor cleaning instructions. - Section 1-2 (previous 1-1) General information renamed General information about disinfection. - 1st bullet after 2nd Caution replaced "Do not use harsh detergents..." by "Unless specified otherwise, do not use harsh detergents..." - Section 1-3 (previous 1-2) replaced title "Equipment cleaning instructions" by "Patient contact surface cleaning instructions".
5131764-4-100	April 12, 2006	Release for M5B-2. Update of 5131764-3-100. Main changes: - Print images no longer show a ruler. References to and illustrations of the ruler have been removed. - SPR EURge39295. Message information and corrective actions for errors I31 and I32 have been modified. - SPR EURge47886. <i>Notice</i> added (chap. 5, section 3-2), warning of possible damage to keyboard slides if excessive force is applied to the keyboard. - Page numbering corrected in manual 5131764-4-108.
5131764-5-100	November 24, 2006	Product: Senographe DS Program: Nephtys Technical Release: M5B_FB Added FB Exception information in Viewer chapter (section 1-1) and in Printing chapter (section 3-6). Added grid characteristics in Specifications chapter section 1-5).

REV	DATE	REASON FOR CHANGE
5131764-6-1EN	May 24 2007	Product: Senographe DS Program: Nephtys post M4(9) Technical Release: Madras DS Update of 5131764-5-100. Main changes: - Modified Section 1.1 Normal Entry in Chapter 6 Startup and Shutdown. - Section 1.2 Change Password of Chapter 6 Startup and Shutdown moved into Chapter 7 User Session and Account Management. - Modified Chapter 7 User Session and Account Management, procedures and screen captures update. - Added Section 3.1 Annotation Content in Chapter 11 Viewer. - Added information about image size in Chapter 11 Viewer (Section 3.2 Annotation Level). - Added information about flexible compression paddle in Chapter 12 Image Acquisition Procedure (Section 7 - Compression). - Added information about the breast thickness in Chapter 12 Image Acquisition Procedure (implemented and renamed Section 8 Thickness Display). - Implemented information in Chapter 17 Characteristics (implemented Section 1-3, Section 1-5 moved to Section 2-9, and new Section 2-6). - Added Section Meaning of symbols (page 5) (WEEE labelling, People's Republic of China Environmental Regulation - RoHS labelling, Earth (ground) labelling...). - For Chinese version only: Added Sub-section People's Republic of China Environment Regulation in Section Recycling (page 5)
5131764-7-1EN	August 31, 2007	Product: Senographe DS Technical release: Nephtys post M4(10) Update of 5131764-6-1xx rev 1. Main changes with following topics: BO070706_DS_MEMORIZED POSITIONS - The description given in Senographe Essential OM 5195660-1-1XX for memorized positions is copied to chapter 3 page 24. BO070718_DS_AUTPRINT - The note "Film size used for autoprint is 8x10in" is added in chapter 8 Browser, section 8 Tools menu utilities, sub-section 8-3 Medical Application Preferences, page 76. BO070717_DS_PRINTING CHAPTER - Description in chapter 13 Printing, pages 135 and 136 is improved, reusing parts of Essential OM printing chapter: 1 Printing conditions, 1-1 Potential printers, 1-2 Film sizes with only small images, 1-3 Types of images which may be printed, 1-4 information which is not printed, 1-5 Printing scale, 1-6 Printing process.

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REV	DATE	REASON FOR CHANGE
5131764-7-1EN	August 31, 2007	BO070123_DS&ESS_AUTODELETEFEATURE - Section "Autodelete" of chapter Browser, sub-chapTools menu utilities, 8-3 MedApp Prefs is improved, with following note: When the function is turned on, at least one of the profile buttons must be selected; if the disk system's used capacity reaches the Upper Threshold value*, the oldest exams are deleted by the system to make space for new ones, until the disk space reaches the Lower Threshold value*. Images which have been on the disk for less than the Minimum Storage time* are not deleted. * Values for Upper Threshold, Lower Threshold and Minimum Storage time have been adjusted by your Field Engineer at system installation, according to the workflow information you provided to him. Call your Field Engineer in case you want to modify those settings. BO070511_DS&ESS_PRINTMODEL - In chapter Printing, illustrations of Printing Models are replaced to reflect correct software operation. BO070713_DS&ESS_IHEMEDAPP - In chapter worklist / section 2 Image Acquisition / 2-1 Medical Procedure Card, the snapshot is updated to show " Implant present " check buttons. Explanation added. BO070717_DS&ESS_SPOTPADDLEWITHPV - In section Processing, a note is added after the existing notes as follows: Note: When acquiring images with Spot paddle in Mag mode or in Contact mode, the Premium View algorithm output may not be optimal. In this case, a satisfactory image display may be obtained by adjusting window level and window width. BO070823_AWS storage-capacity - Chapter "Specifications" - section 1-4 : AWS storage capacity updated to reflect ADS U20 computer technology.
	October 24, 2007	Litchi project - Sent to translation in EL, TR, HU, PL, RU, DA, FI, NL, NO, SV.
5131764-7-1EN	December 12, 2007	Litchi-P project Sent to translation in PT-PT.
	March 5, 2008	Draft for submission to FDA for product Senographe DS: Introduction of AOP FlexDose feature in Chapter 12 See Read Me for a detailed table of modifications to this publication

REV	DATE	REASON FOR CHANGE
5307907-3-S-1EN	January 8, 2009	Product: Senographe DS Technical Release: Nephtys post M4(13) Update of 5307907-2-899-1EN. Main changes: Becomes MQSA compliant AOPFlexDose Chapter 12 Section 4-3-1 AOP configuration at installation - Created TR variables for: Profile and Classic - Corrected content as requested in FDA Feedback Date format Chapter 8 Section 5-1 and Chapter 9 Section 2-2-1 - Created a translation correspondence table for months of the year Error messages Chapter 16 Tables 1 and 2 - Deleted I07, S52, BB1, BB2, BB3, BB5 and BB7. Chinese OM Only - Updated table of Hazardous substances. Spanish OM Only Chapter Regulatory - SPR clone INTGE00944 "Representante autorizado in Europa" replacing "Sede central europea".

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